



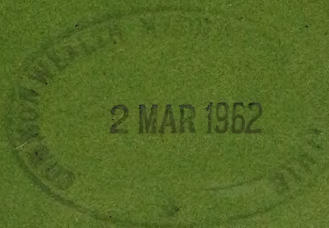
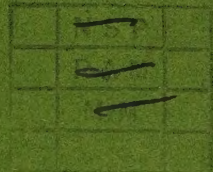
Zanzibar Protectorate

Annual Report
of the
Department of Agriculture
for the year 1960

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ZANZIBAR

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His Highness the Sultan, while Regent, visited Kizimbani Experimental Farm on 1st September.
He is seen with the Director of Agriculture discussing cocoa.

Annual Report of the Department of Agriculture, 1960

PART I.—AGRICULTURE IN THE PROTECTORATE

1. General

The year 1960 was one in which improved prospects and greater buoyancy in one aspect of the agricultural industry contrasted with an increasing depression in another. By the end of the year the producer must have felt that no sooner was he to emerge from one economic difficulty than he would be precipitated into another. Nevertheless, 1960 brought greater economic prosperity or strength to the agricultural industry as a whole than did 1959, for the total of domestic exports increased by nearly one quarter in value, or by almost £1 million. This increase was almost entirely due to the great improvement that took place in clove sales which provided over £890,000 more income than in 1959. Not all of the increased income, however, found its way directly to the agricultural community, for half the cloves exported were stocks that had been purchased from the growers in previous years. The consequential improvements in the financial position of the Clove Growers' Association, however, cannot fail to benefit the producers in future years.

2. Clove exports during 1960 reached a level that had not been attained since 1950, and coupled with a small clove crop, resulted in the Clove Growers' Association reducing its stocks and particularly its financial commitments very considerably. Thus by the end of the year the Association was in a stronger position to lend support to the industry than it had been during the past two years. The small size of the 1960/61 clove crop, however, meant that the agricultural community, most of whom participate in one way or another in a large clove crop, was in a relatively depressed condition at the end of the year. This situation was aggravated by the fact that prices for copra and coconuts had fallen steadily during the year and by December had dropped to a level which had not been experienced since the middle of 1955, except for a brief fall in July, 1957. Although the coir fibre industry continued to expand, here also prices showed a downward trend during the last six months.

3. An encouraging feature of the year was the fact that 350 landowners in Zanzibar and Pemba demonstrated their willingness to grow cocoa, and it was possible to distribute nearly 100,000 seedlings in 1960 and to make preparation for the issue of double this number in 1961. A grant of £87,927 from Colonial Development and Welfare funds was approved for the development of the cocoa industry over the next five years. The scheme visualises the issue of $2\frac{1}{4}$ million seedlings and the establishment of about 3,000 acres of cocoa on private land during the period. It remains for Zanzibar's landowners to take full advantage of this assistance. An extensive survey was made to see whether there were any areas which would be suitable for the establishment of cocoa plantations by the Colonial Development Corporation, but suitable land could not be found in blocks of a sufficient size likely to meet the Corporation's minimum requirements.

4. Consideration was given to the establishment of a desiccated coconut industry but on the basis of current prices for desiccated coconut and for copra it was clear that it would not be profitable. A development which it is

hoped may result in a useful secondary industry was the teaching of the spinning and weaving of coir yarn which was organised by the Copra Board. It is clear, however, that for success to be achieved the industry must be based on traditional skills and aptitude backed by adequate supervision aimed at the acquisition and maintenance of high standards.

5. Fishermen continued to show considerable interest in changing from their traditional cotton nets to those made of nylon and in Zanzibar island made good use of the loans scheme. The export of *crustacea* and similar specialities also continued to develop.

6. A stock census was carried out during the year and revealed that the numbers of cattle were now 45 per cent. greater than nine years ago. Taking into account also the larger numbers that are now being slaughtered for home consumption, replacing imports, it is clear that good progress is being made in the direction of self-sufficiency. The increasing acceptance by stockowners of veterinary assistance, particularly in the treatment of trypanosomiasis, is considered to be largely responsible for the increase in the cattle population. The development of the livestock industry generally continues on the lines already adopted and the new five-year development plan provides for the continuation of the two stock development schemes.

7. Towards the end of the year Government obtained through the Colonial Office the services of Mr. T. Y. Watson C.M.G., M.B.E., formerly Minister of Agriculture in Uganda and Mr. P. Selwyn, Senior Economic Adviser at the Colonial Office, to undertake an economic and fiscal enquiry in Zanzibar. Their terms of reference included the preparation of an economic development plan with special reference to agricultural production, together with recommendations as to the practical measures that would be necessary for the execution of the plan. Mr. Watson and Mr. Selwyn spent some six weeks in the Protectorate visiting both Pemba and Zanzibar and seeing a cross section of the Protectorate's agriculture and agriculturists. Their report is awaited.

2. Weather

8. Total rainfall for the year was below average in almost all parts of Zanzibar and Pemba, the principal exceptions being the eastern areas of both islands, where rainfall was unusually heavy during the first six months of the year. Elsewhere the shortfall in total rainfall amounted to about 15 per cent. in Zanzibar and 18 per cent. in Pemba. These follow shortfalls of 12 per cent. and 20 per cent. respectively during 1959.

9. January and February were dry in Pemba but useful showers were received in Zanzibar. March was unusually wet and there was little to distinguish the March rains from the main rains which followed them in April. These latter were not unusually heavy but were prolonged well into May and useful showers were received in June, a month which is commonly rather dry. At most recording stations rainfall was well above average by the middle of the year, though this was not so at Selem in Zanzibar and Wete in Pemba, both stations being in the northern halves of the islands. Generally, however, both from the point of view of the rice crop and for the establishment of the tree crops the main rains could hardly have been better.

10. Nevertheless, the year will be remembered for the extremely dry period from July to December. The customary "*mchoo*" rains of August did not appear in Zanzibar and in both islands the short rains of November failed almost completely. During these rains precipitations of about 10 inches is expected within a period of three to four weeks. This year, however, nine

out of the twelve recording stations in Zanzibar received less than ten inches of rain and five stations less than seven inches within the six months from July to December, while in Pemba many stations had less than 12 inches of rain during the period. The average for the second half of the year ranges from about 12 inches in the driest areas of southern Zanzibar and eastern Pemba to 27 inches in the central area of Zanzibar. Thus, much of Zanzibar received no more than a quarter of its normal rainfall during the second half of the year. For a number of stations, both in Zanzibar and Pemba, the six months' rainfall was the lowest recorded since the stations were opened, some as much as 40 years ago.

11. Rainfall is recorded at 10 stations in Pemba and 12 in Zanzibar. Temperatures and humidity are recorded at Wete in Pemba and at three centres in Zanzibar. Detailed rainfall figures are given in Appendix V.

3. Principal Crops

CLOVES.

12. Cloves from the 1959/60 crop continued to come on to the local market throughout the early part of the year, most of the sales at this time being to the Clove Growers' Association. The clove crop for the seasonal year from July, 1959, to June, 1960, amounted to 18,097 tons (11.58 lakhs of frasila*) of which 15,778 tons (10.10 lakhs of frasila) or 87 per cent. was the produce of Pemba. Offering guaranteed buying prices which maintained a floor to the market, the Clove Growers' Association purchased 11,708 tons out of the total, this amount in itself being equivalent to a normal year's exports.

13. Legislation that came into force on 1st January, 1960, provided for the names of the three export grades of cloves to be changed to Special Quality, Standard Quality and Distillation Quality. At the same time the maximum moisture content permitted was reduced from 16 per cent. to 14 per cent. and various other small adjustments were made. From the beginning of the 1960/61 season the Clove Growers Association adopted these three grades when purchasing cloves in place of the four grades used previously. Other legislation promulgated in January permits the export of cloves in parcels of 28 lb. and 56 lb. and in retail packages in addition to the bags or bales of 112 lb. and 140 lb. formerly allowed.

14. Picking of the 1960/61 crop commenced in August with picking rates at 25 to 30 cents per pishi of green cloves. For the new season the Clove Growers' Association raised its floor prices by Shs. 10 in Zanzibar and Shs. 11 in Pemba, thus reducing the differential between the two islands. For Zanzibar, the Association's prices were Shs. 85, Shs. 80 and Shs. 75 per 100 lb. for special, standard, and distillation quality cloves respectively. In Pemba, each was four shillings lower instead of five shillings lower as previously.

15. The 1960/61 crop was known to be small and with the prospect of large export orders towards the end of the year the local market was buoyant, the price rising to Shs. 94 per 100 lb. standard quality in October and November and to Shs. 100 in December. Total arrivals during the six months from 1st July amounted to 4,361 tons—compared with 11,062 tons for the same period of the previous season—of which 3,888 tons were from Pemba and 473 from Zanzibar. The dry weather resulted in the marketing of cloves that were clean and bright enabling shippers to meet the requirements of the grocery trade and quality markets in Bombay, the United Kingdom and the United States of America and to find adequate supplies of Special Quality grade.

*In Zanzibar a frasila is 35 lb. One lakh is 100,000.

16. Exports were at a much improved level compared with 1959. During the first quarter 3,278 tons were exported, during the second, 920 tons, the third, 4,702 tons and the fourth, 3,490 tons, making a total of 12,347 tons for the calendar year. This is the highest figure since 1950 and compares well with the 9,235 tons exported in 1959. Of this total, Indonesia took 7,500 tons or over 60 per cent. as compared with 5,150 tons (55 per cent.) in 1959. Indian purchases, on the other hand, declined once again from 978 tons in 1959 to 861 tons in 1960. This constitutes less than seven per cent. of total exports, and for the first time Indian exports were exceeded by those to Continental Europe, which took 897 tons. Other major purchasers were the United States of America (825 tons as compared with 384 tons in 1959) and Pakistan (627 tons). More than 40 other countries received shipments directly from Zanzibar.

17. Legislation governing the Association's contributions to exports remained unchanged and thus of every 100 lb. exported from the Protectorate, 50 lb. was required to be purchased from the Clove Growers' Association. The Association's selling prices for such cloves were Shs. 250 per 100 lb. for Special Quality, Shs. 240 for Standard Quality and Shs. 225 for Distillation Quality. These prices show reductions of Shs. 20, Shs. 15 and Shs. 25 respectively on the corresponding prices for 1959. Special reductions were also made for bulk purchases of 500 tons or over.

18. Duty on cloves exported during the period from 1st January to 30th September was Shs. 60 per 100 lb. From 1st October it was raised to Shs. 65.

19. The Association remained the sole bulk purchaser of clove stems, buying 4,149 tons, as compared with 1,052 tons in 1959 and 4,411 tons in 1958. The Association also continued to be the sole distiller and exporter of clove stem oil. Some 148½ tons were shipped during the year, comparing well with 136 tons in 1959 and 91 tons in 1958.

COCONUTS.

20. The local price of coconuts fell progressively throughout the year from a range of Shs. 140 to Shs. 200 per 1,000 nuts, unhusked, on the heap at the beginning of the year to a range of Shs. 85 to Shs. 110 at the end of the year. This fall in price was mainly due to reduced prices for copra, but prices for whole nuts in overseas markets also fell. During 1960 some 7,814,250 nuts were exported, of which 5,858,225 went to the United Kingdom and Continent.

21. Copra prices on the local market in Zanzibar island rose during January to a peak figure of Shs. 68/57 per 100 lb. but thereafter declined continuously, falling to Shs. 38/57 per 100 lb. in June. There was some recovery during the third quarter of the year but there was a further recession in November, prices finally falling to an average of Shs. 37/14 per 100 lb. in December. Fair quality copra in Pemba fetched some five to fifteen shillings per 100 lb. less than the prices quoted for Zanzibar. Low grade Pemba copra was sold at as little as Shs. 15/- per 100 lb. At the end of the year the copra industry was in a depressed state with both prices and exports at a low level. Total exports of copra for the year amounted to 4,508 tons, the lowest figure recorded for many years, apart from 1957. India has been Zanzibar's best market for copra for a number of years and the restrictions that have been placed upon imports of copra from Zanzibar and which were intensified in 1960, have adversely affected the trade.

22. The coconut oil industry benefited from the fall in prices of copra and coconuts and production increased during the first nine months of the year. Thereafter there was a fall in the price of oil on the East African mainland,



Healthy clove trees, about 20 years old.



Filling bags with cloves for export.



Three stages of cloves: buds, flowers and over-mature cloves.

which is Zanzibar's main market, and production became once again unattractive. Total exports of oil during the year amounted to 2,671 tons compared with 1,441 tons in 1959 and 3,334 tons in 1958. The single oil mill in Pemba exported 173 tons.

23. Exports of coconut products for the year are shown in the accompanying table where they are also compared, as copra equivalent, with those of previous years.

		<i>Exports</i>		<i>Copra Equivalent</i>	
		<i>1960</i>	<i>1960</i>	<i>1959</i>	<i>Average</i>
		<i>tons</i>	<i>tons</i>	<i>tons</i>	<i>1954-58</i>
					<i>tons</i>
Copra		4,508	4,508	7,911	6,008
Coconut oil		2,671	4,452	2,402	6,357
Coconuts		*7.81	1,116	1,054	467
Soap		1	1	1	2
TOTAL			<u>10,077</u>	<u>11,368</u>	<u>12,834</u>

*Millions of coconuts.

24. Although copra exports were very slightly larger in 1959 and 1960 taken together, than they were on average during the previous five years, there was a fall in exports of coconut oil which was not matched by the increase in the number of whole coconuts exported.

Exports of other coconut products were as follows:—

		<i>1960</i>	<i>1959</i>	<i>1958</i>
		<i>tons</i>	<i>tons</i>	<i>tons</i>
Copra cake		2,513	1,495	2,892
Coir fibre		5,909	3,196	2,425

25. The coir fibre industry continues to expand at a satisfactory rate, the value of the coir fibre exported now exceeding £200,000. A coir factory was opened in Pemba and an additional one in Zanzibar, bringing the total in operation at the end of the year to nine. A feature of the year was the introduction by the Copra Board of simple hand-operated machines for the spinning and weaving of yarn as a village industry. Some 5,900 coir net bags were made at the Board's factory during the year and used for the export of whole coconuts. This is a small industry which shows promise of expansion.

4. Minor Export Crops

26. The upward trend in prices for dried chillies, which had been so marked during 1959, continued during the early part of 1960, the local market price being Shs. 275 per 100 lb. compared with Shs. 110 per 100 lb. at the end of 1958. Following a fall to Shs. 200 during the second quarter there was a recovery during the fourth quarter and the open market price ruling at the close of business on 31st December, 1960, was Shs. 225 to Shs. 250 per 100 lb. The improved prices in 1959 had resulted in increased plantings in that year and enhanced supplies began to come on to the market during the second quarter of 1960, but dry weather greatly restricted growth and fruiting in the second half of the year. Total exports for the year amounted to 60 tons, compared with 33 tons in 1959. This is a noteworthy increase but the total still does not compare well with the 71 tons exported in 1957 or the 252 tons shipped in 1905. The market remains unsatisfied and there is scope for increased plantings of this crop, which is so well suited to the coral areas of both islands and the family labour which is available there. The dry weather of the second half of 1960

prevented any major increase in planting taking place in this year, but a very welcome development was a change in the attitude of Pemba cultivators who for the first time for many years began to show an interest in the crop. In the absence of traders prepared to purchase the crop in Pemba the Clove Growers Association assisted by receiving small parcels, sending them to Zanzibar for sale and then paying the owner the sale proceeds less deductions for handling and shipping only.

27. Exports of coil tobacco again showed an improvement, rising to 22,247 lb. valued at £1,000, compared with 15,630 lb. in 1959. The whole of this amount was shipped to Somalia during July.

28. The derris market showed no improvement and it was only possible to dispose of three lots each of half a ton during the months of January, April and July for shipment to Australia. Including a further 50 lb. sold to Rhodesia, total exports amounted to 3,410 lb.

29. The lime crop was greater than in 1959, and the Clove Growers' Association purchased 97 tons of limes, at 20 cts. per lb., compared with 29 tons. These were processed by the Association to give lime oil for export and juice for home consumption and export. Production amounted to 640 lb. of oil and 3,725 gallons of racked juice. The juice was sold partly as racked juice and partly as syrup or cordial. Exports amounted to 5 cwt. of oil and 45 gallons of juice, compared with 212 lb. and 94 gallons, respectively, in 1959. Difficulty was experienced in finding sales for the juice in the Rhodesian and South African markets which had shown interest in previous years, principally because contracts had already been placed elsewhere.

30. A Zanzibar merchant was permitted to import ten tons of unshelled cashew nuts in order to encourage him to establish a small processing factory. It was hoped that the existence of a factory would encourage Pemba growers to harvest and market nuts from their own trees. The factory is not yet in operation however. Although the Clove Growers' Association tried to assist in the establishment of a cashew nut industry by offering to find a market for any supplies brought in, it did not succeed in purchasing any. The Pemba crop, which is obtained from trees which are growing almost untended, is either prepared in the villagers' homes and sold from door to door in Wete and Chake Chake at Shs. 4 to Shs. 5 per pishi or is left on the trees for children.

31. Licences for culling seaweed were issued as in former years. The overseas market for the Zanzibar type of seaweed improved during the year and 79 tons were exported.

5. Food Crop Production

32. At the commencement of the 1959/60 rice season a vigorous campaign to encourage rice planting was undertaken, using radio broadcasts, posters and meetings with the villagers. The campaign showed some success in that the acreage increased by nearly 4,000 acres to over 21,000 acres. This figure still falls short of the acreages achieved during the war and there is much suitable rice land, particularly in Zanzibar, which is not being fully utilised. Comparative acreages for the 1959/60 season and for previous years are shown in the following table:—

Year			Pemba	Zanzibar	Total
1960	..	..	11,690	9,612	21,302
1959	..	..	10,958	6,573	17,531
1958	..	..	7,027	*2,865	9,892
1957	..	..	9,675	7,878	17,553
1956	..	..	7,087	4,068	11,155

*Much of the planted acreage was abandoned following adverse weather.

33. Pemba rice was planted rather late and there was loss by flooding during April. Growing conditions were otherwise good and the yield per acre of dried paddy was estimated from samples to be 1,636 lb., which is slightly above average. In Zanzibar, where crop growth was similar, the yield per acre was 1,518 lb. These figures refer to field weights at harvest of the samples reduced by 15 per cent. for drying. On the basis of these figures it is estimated that 4,522 tons of clean rice were obtained in Pemba and 3,908 tons in Zanzibar, a total of 8,430 tons, compared with 6,862 tons in 1959.

34. During the rice planting campaign stress was again laid on the value of artificial manures and supplies were made available for sale to the public. The response was better than in previous years, sales amounting to five tons of single superphosphate and two tons of sulphate of ammonia. These figures are, of course, pitifully small in relation to the needs of the crop. (See Part II, section 3 of this report.)

35. Other grain crops and root crops when planted before the middle of the year made good growth. Cassava planted in the short rains of 1959 did particularly well with the result that cassava root, both fresh and dried, was abundant throughout most of 1960. Prices to the producer fell to as low as Shs. 2 per bag of fresh root and Shs. 7 per bag of dried root in Pemba, and resulted in small quantities being exported to the mainland.

36. From the middle of the year rainfall was insufficient for proper growth of the crops that are customarily planted in the second half of the year, including cereals, pulses and root crops. The coral areas of Zanzibar were particularly hard hit and many of the bushland plots which had been cleared and prepared for sowing with maize and other crops failed to produce a crop in spite of repeated sowings and others were not sown at all. These plots will be used for early planting in 1961.

37. At the close of the year supplies of foodstuffs were generally still abundant at the main markets of both islands and in the western cassava-growing areas but a shortage of food was beginning to develop in the south and east of Zanzibar.

6. Animal Husbandry

38. A census of cattle, sheep, goats and donkeys was carried out in Pemba between August and December and in Zanzibar during the month of November. Poultry were also recorded in Pemba. The census was made as on all former occasions, not by a physical count of the stock, but by recording the numbers which the owners claimed to possess. Regrettably, the stock-owners of four shehias in the Mangapwani area of Zanzibar failed to co-operate and the figures are therefore to this extent incomplete. In the following tables the numbers recorded in 1960 are compared with those of previous censuses.

<i>Cattle</i>						
<i>Year</i>			<i>Zanzibar</i>	<i>Pemba</i>	<i>Total</i>	
1960	..	..	*15,223	31,525	*46,748	
1951	..	..	9,662	23,307	32,969	
1947-49	..	..	6,640	21,028	27,668	
1938	..	..	6,908	23,153	30,061	

<i>Goats</i>						
<i>Year</i>			<i>Zanzibar</i>	<i>Pemba</i>	<i>Total</i>	
1960	..	..	*10,057	4,140	*14,197	
1951	..	..	11,392	2,345	13,737	
1938	..	..	11,025	2,906	13,931	

<i>Sheep</i>			<i>Zanzibar</i>	<i>Pemba</i>	<i>Total</i>
<i>Year</i>					
1960	..	..	*71	73	*144
1951	..	..	42	195	237
1938	..	..	19	109	128

<i>Donkeys</i>			<i>Zanzibar</i>	<i>Pemba</i>	<i>Total</i>
<i>Year</i>					
1960	..	..	*960	415	*1,375
1951	..	..	848	481	1,329
1938	..	..	1,022	1,380	2,402

*Incomplete.

Assuming that there were some 1,000 cattle in the four unrecorded shehias the total cattle population in 1960 was about 47,750 which constitutes an increase of 45 per cent. for the whole Protectorate and 68 per cent. for Zanzibar over the figures of the previous census. In Pemba there are now 23.6 head of cattle per 100 people and in Zanzibar 9.8. In 1938 the corresponding figures were 11.1 and 2.5. Taking into account the losses and gains through slaughters, exports and imports, the effective production in Pemba during the nine years since 1951 was 34,382 head of cattle which represents a yearly increase of 15 per cent. The populations of sheep and goats have remained almost stationary, while the number of donkeys has decreased.

39. The census figures confirm that the cattle industry is now in a position to make a valuable contribution towards the Protectorate's meat supplies. During both 1959 and 1960 there were no imports of slaughter cattle to Pemba, whereas formerly the numbers had fluctuated between about 400 and 1,500 depending on the clove season. At the same time, whereas exports of cattle from Pemba to Zanzibar were usually less than a score and were confined to breeding animals, in 1960 the number rose to 445, almost all of which were slaughter stock. These sales were in part the result of the depressed financial state of many Pemba stock-owners but were made possible by the increased stock holdings.

40. The numbers of cattle, goats and sheep imported into the Protectorate again fell considerably, cattle imports now being less than half what they were three years ago. This reduction, however, was due not only to the increased numbers of animals being produced within the Protectorate but also to there being comparatively less money in the hands of agriculturists and those who during the season undertake the picking of cloves.

		<i>Stock Imports</i>				
		<i>1960</i>	<i>1959</i>	<i>1958</i>	<i>1957</i>	<i>1956</i>
Cattle	..	1,737	2,246	3,148	4,026	4,862
Goats	..	9,592	11,025	10,932	10,625	12,339
Sheep	..	689	1,035	1,198	1,208	1,319

Of the 1960 imports, all the cattle, 63 per cent. of the goats and 93 per cent. of the sheep came from Tanganyika. No cattle were imported from Somalia this year but 2,855 goats came from there. Kenya was the only other source of supply of livestock.

41. The numbers of stock slaughtered for meat at the Zanzibar town abattoir and in the townships and rural areas of Pemba are recorded in the accompanying tables. They show little change from those of the preceding two years, but are low in comparison with the number slaughtered in 1956 and 1957. At the Zanzibar abattoir one animal was totally condemned for showing generalised tuberculosis and some 3,500 partial condemnations were made, mostly in respect of lungs.

Slaughter Stock. Zanzibar Town Abattoir

		<i>Oxen</i>	<i>Cows</i>	<i>Calves</i>	<i>Goats</i>	<i>Sheep</i>
Local stock	..	1,148	424	419	3,318	5
Imported stock	..	1,918	2	—	10,501	1,038
TOTAL	..	<u>3,066</u>	<u>426</u>	<u>419</u>	<u>13,819</u>	<u>1,043</u>
1959 Total	..	2,974	274	353	13,319	1,570
1958 Total	..	3,082	268	237	12,331	1,603

Slaughter Stock. Pemba

			<i>Bulls</i>	<i>Cows</i>	<i>Goats</i>	<i>Sheep</i>
Local stock	..	..	2,418	1,358	1,026	4
Imported stock	..	..	—	—	—	—
TOTAL	..	..	<u>2,418</u>	<u>1,358</u>	<u>1,026</u>	<u>4</u>
1959 Total	..	..	2,167	1,069	1,140	1
1958 Total	..	..	2,135	831	1,020	18

42. The preparation of butchers' hides and skins by suspension drying at the Government drying shed in Zanzibar town continued under the supervision of the Veterinary Officer, who writes of the battle against careless flaying and some indifference towards the use of insecticides to combat the hide beetle. It is clear that without continued supervision and pressure the quality of the hides would fall. In Pemba, 2,027 hides and 53 skins were inspected at the Wete Customs sheds during the year. All had been suspension air dried at various places such as Mtambile, Chake Chake, Ole, Mtambwe, Kojani and Wete, and had been treated with an insecticidal dust. Salt-curing continued at Chake Chake although a new drying shed built early in the year was used. No salt-cured hides were brought for inspection. The numbers of hides and skins dealt with at the Zanzibar shed were as follows:—

				<i>Hides</i>	<i>Skins</i>
From abattoir	..	..	..	4,031	14,737
From rural areas	..	..	..	580	2,396
TOTAL	..	..	..	<u>4,611</u>	<u>17,133</u>
1959 Total	..	..	..	4,010	17,191
1958 Total	..	..	..	3,960	16,238

43. There were no major outbreaks of animal disease during the year. The quarantine proved its efficiency, however, when a single case of anthrax was discovered amongst imported slaughter goats, and a number of cases of foot and mouth disease, type A, were found in slaughter cattle from Tanganyika. Neither of the diseases spread outside the quarantine. A South African strain of foot-and-mouth disease, SAT. 2, was found about the same time in dairies near Zanzibar town but spread was prevented by imposing local movement restrictions by agreement with the herd owners. Restrictions on the importation of cattle from Kenya, to keep out lumpy skin disease, were modified during the year to permit importation from most parts of the country. Dairy herd owners at once took steps to replenish their grade herds, which had become somewhat depleted.

PART II.—THE WORK OF THE DEPARTMENT

1. Staff

44. The establishment of the Department was changed only by the addition of one post of Assistant Agricultural Officer. All posts were filled except that of Entomologist. One local officer joined the Department and one expatriate officer on completion of his pensionable service was replaced by one on contract terms. The junior field staff was slightly under strength following retirements.

45. The senior staff of the Department is listed at the cover of this report. The Director was in charge of the Department throughout the year except for a short period in January, when the Assistant Director acted. The latter was relieved by Mr. Webdale during this period and for three months from July to October. Mr. Webdale was substantively in charge of Zanzibar District and Mr. Buckler of Pemba District. Mr. Othman Shariff remained responsible for artificial insemination work and took over from the Veterinary Officer when the latter went on leave. Dr. B. E. J. Wheeler, seconded from the Colonial Pool of Plant Pathologists, continued to work on withertip disease of limes, and Mr. B. H. Hyde-Wyatt of the Colonial Pesticides Research Unit continued investigations into the control of the coconut pest, *Pseudotheraptus wayi*.

46. Mr. Said Hamed Mauly took sabbatical leave and attended Reading University to receive instruction in statistics and field experimentation. Mr. M. A. Ghassany, who was engaged on special extension work, received a United States offer to visit the States and neighbouring areas to gain experience of extension methods, and left in December for a proposed period of four months. Mr. Y. O. Tawakali obtained his Diploma in Agriculture at Makerere College and joined the Department as Assistant Agricultural Officer. Three local men were in training in the United Kingdom on Government Scholarships, one studying for a forestry degree at Oxford, another taking a course with the Forestry Commission, and the third studying veterinary medicine at Edinburgh.

47. In June, the Department mourned the death of Mr. A. A. Wadud, who died suddenly at a very early age. After obtaining a Diploma in Agriculture at Makerere College, Mr. Wadud entered the Department in 1945. He later obtained a Diploma in Forestry at Upper Topa (Murree Hills), Pakistan, and as Forester in the Department took part in the development of forestry in the Protectorate.

2. The Development Programme

48. The 1959 annual report mentioned that a number of schemes put forward by a Working Committee, and which consisted entirely of schemes which had been in operation during the previous period, were accepted by the legislature at the end of 1959 for inclusion in the 1960-64 development plan. In early 1960 certain of these schemes were accepted by the Secretary of State for inclusion in a general scheme for agricultural development, to commence from 1st April, 1960, and to rank for 85 per cent. assistance from Colonial Development and Welfare funds. These schemes and their full values are as follows:—

			£
Stock Improvement	..	..	28,922
Fisheries Development	..	..	13,096
General Crop Development	..	..	13,635
Stock Raising	..	..	21,289
Clove Diseases	..	..	5,104
Mechanical Cultivation	..	..	25,041
Citrus Fruit Industry	..	..	9,128
TOTAL	..	..	<u>£116,215</u>

49. The above list does not include the Insect Research scheme (for the control of the sucking bug of coconuts), which was not accepted for C.D. & W. assistance and which will now be terminated more quickly than had previously been intended.

50. A new development scheme, for which an 85 per cent. Colonial Development and Welfare grant is to be given and which commenced on 15th October, 1960, is for Cocoa Development. This scheme is estimated to cost £87,927 over the five years.

51. The scheme for General Crop Development finances some five small demonstration farms started in 1948, at which expenditure is now kept to a minimum, and ten plots planted in 1959 and 1960 to demonstrate the growing of cocoa, coffee, nutmegs and limes; it pays for the operation of seven small processing plants at which rice and other crops are milled on payment and it provides for miscellaneous development work such as that now being undertaken with Turkish tobacco.

52. The schemes mentioned above are discussed in the sections of this report which follow.

3. Crop Husbandry

BANANAS.

53. The Department is now using bananas on a large scale in cocoa fields to produce ground shade, to act as a windbreak and above all for the provision of mulch. Private growers are being urged to do the same.

54. In a manurial trial at Kizimbani highly profitable responses to farmyard manure, to coir dust mulch and to phosphate have occurred during the second year of harvest. During the first year the response to farmyard manure was particularly noteworthy.

CASSAVA.

55. At Kizimbani and at two minor centres in Zanzibar testing of Amani cassava varieties continued. Bred for resistance to virus diseases, their yields, palatability and susceptibility to the diseases are compared with those of a local variety or varieties. Of 22 varieties received in 1950, all have now been discarded except one, 46106/27; of 11 varieties received in 1953, six are under test at present; of five varieties received in 1956, two have been retained, namely 5317/21 and 53121/22. Two trials were in progress at Kizimbani during the year and will be harvested in 1961. At Mkwajuni and Makunduchi the two varieties 5315/39 and 53121/22 gave the highest yields at both centres, averaging 43 per cent. and 30 per cent. more per plant than the local varieties.

56. Planting material of proved varieties is issued free to cultivators on application, and in 1960 Kizimbani supplied sufficient to plant 24 acres.

57. Other trials at Kizimbani were concerned mainly with investigating the inter-relationship of growth period, spacing and manuring with yield. A number of conclusions were reached indicating in general that the variety 46106/27 should be allowed to grow for at least 16 months, whether or not farmyard manure is used.

CHILLIES.

58. Eight chillie nurseries were maintained in Zanzibar and 384,400 seedlings were issued, compared with 464,000 in 1959. The reduction in numbers taken was not due to lack of interest but to the failure of the rains in the second half

of the year. Seedlings were also made available at five nurseries in Pemba and it is a pleasure to be able to record that Pemba farmers were prepared this year to plant the crop, taking 47,608 seedlings. All seedlings were issued free in both islands.

59. A manurial trial with chillies at Kizimbani showed a highly significant response to the application of farmyard manure at the rate of 5 tons per acre, the increase amounting to 570 lb. of dried chillies per acre where the unmanured plot gave 359 lb. Inorganic fertilisers showed no significant response. The cost of harvesting was Shs. 1/35 per lb.

CITRUS.

60. Assistance in the expansion of the citrus industry continued to be given to growers under the Citrus Development Scheme by the distribution at subsidised prices of budded and seedling limes and the marking out of the plots to be planted. Some 5,520 budded and 3,737 seedling limes were sold to 205 applicants in Zanzibar at 40 cents and 10 cents respectively. Many more could have been issued had they been available. For 1961 distribution about 100,000 rough lemon stocks had been established in 1959 but the budding of these stocks in 1960 was not very successful, owing to the very dry weather. Only 10,300 budded plants were available by the end of the year. Some 255,000 rough lemon seeds were sown to provide stocks for the 1962 distribution but the dry weather caused many losses when nursery transplanting was finally attempted, after much delay.

61. Continued attention was given to citrus plots previously planted under the development scheme and growers were urged to maintain adequate cultivation and use fertilisers where appropriate. There was a general improvement, particularly in some of the bigger plantations during the early part of the year, but the severe drought during the second half seriously affected the trees in some areas. One grower in Uroa on the east coast of Zanzibar lost 200 lime trees which had been planted in 1955.

62. The Clove Growers Association continued to assist the industry by buying limes at 20 cents a lb. Their purchases increased considerably and are shown in the following table in comparison with those of previous years.

Limes bought by C.G.A. Tons

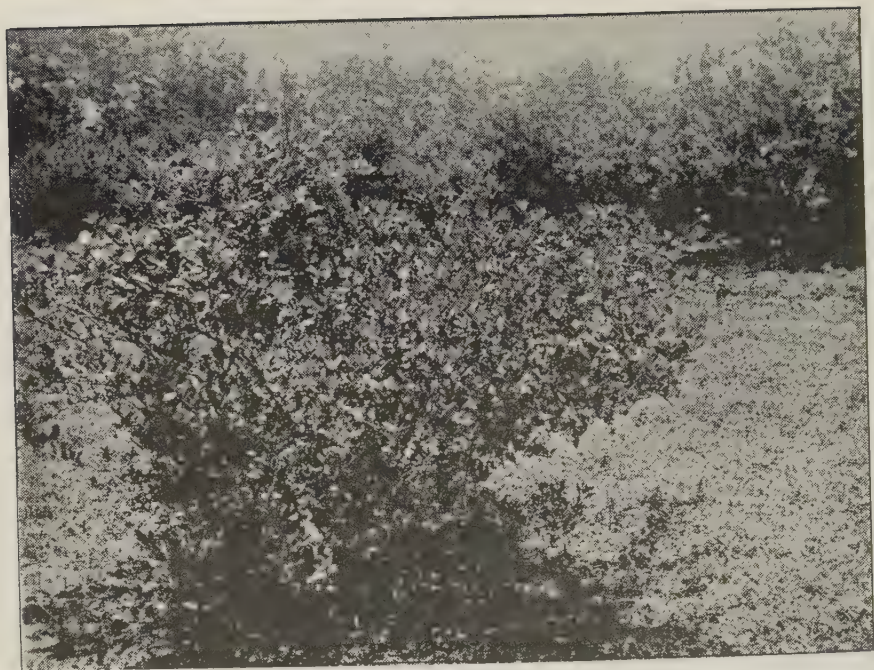
	1960	1959	1958	1957	1956
From departmental plots ..	22.2	7.0	10	24.7	11.6
From the public	74.8	22.0	2	34.3	4.2
TOTAL ..	<u>97.0</u>	<u>29.0</u>	<u>12</u>	<u>59.0</u>	<u>15.8</u>

During the year the Association produced 640 lb. of lime oil and 3,725 gallons of racked juice. The racked juice was either sold as such or processed for sale as lime juice cordial or lime syrup.

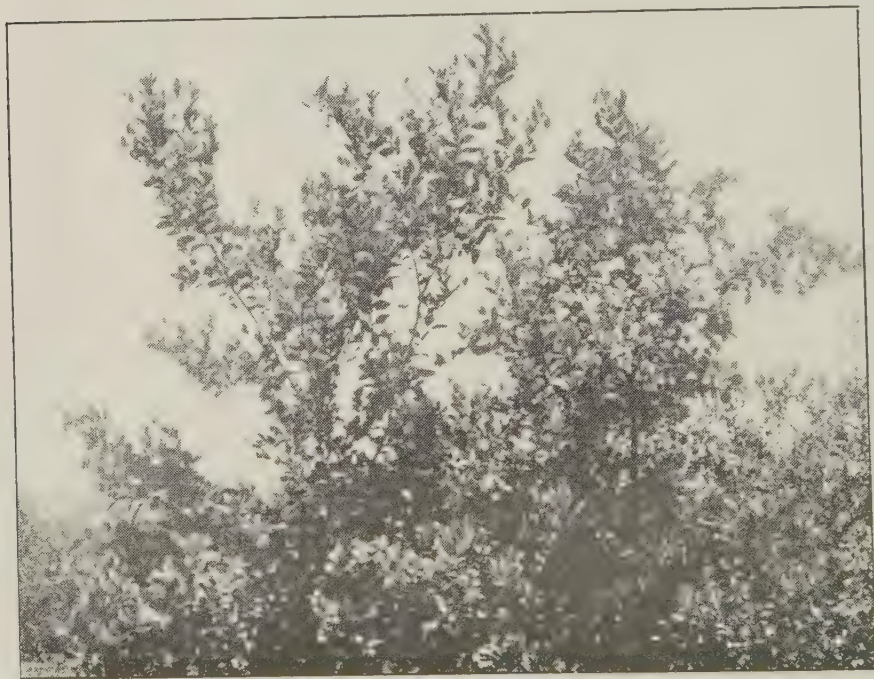
63. Investigations into the control of withertip disease (*Gloeosporium limeticola*) by a Plant Pathologist of the Colonial Pool were continued under a Colonial Development and Welfare Scheme. The very dry weather during the principal flowering and experimental period did not provide favourable conditions for the development of the disease and consequently for the testing of control measures. This was particularly unfortunate as the Pathologist is due to end his investigations in 1961 and there are aspects of the application of his control method which require more investigation. Apart from testing



A leading farmer, Sheikh Rashid Amour Barwani, with grapefruit grown on his plantation.



A seedling lime tree which has developed under constant attack by withertip disease.



A neighbouring seedling lime tree which has been protected against withertip by fungicidal spraying.

the efficacy of spraying with phenyl mercury nitrate as a means of control the Pathologist was also engaged in determining, with the help of the Long Ashton Research Station, Bristol, the amount of mercury that remains on or in the fruit after spraying.

64. At Mkwajuni demonstration plot in northern Zanzibar fair crops were obtained from the orange, mandarin and grapefruit trees but the lime trees continued the decline shown over the past three years, and gave an almost negligible crop.

CLOVES.

65. In accordance with policy the number of clove seedlings raised for issue to the public, in both Pemba and Zanzibar was considerably reduced. There were no free issues, for the Clove Growers' Association had stopped financing the production of seedlings in 1959, and all seedlings were sold at 15 cts. each, compared with 10 cts. in 1959. The cost of production is about 36 cts. In Pemba, growers took some 41,000 seedlings only out of 50,000 made available in eleven nurseries. In Zanzibar there was keener demand and most of the 84,000 available in seven nurseries were taken. Actual issues, compared with previous years, were as follows:—

			<i>Free</i>	<i>Sold</i>	<i>Total</i>
Pemba	..	..	—	41,073	41,073
Zanzibar	..	..	—	82,292	82,292
1960 Total	..	..	—	123,365	123,365
1959 Total	..	..	206,022	205,522	411,544
1958 Total	..	..	272,356	209,595	482,371

For 1961 distribution the number of nurseries in Pemba was reduced to five, for the production of 25,000 seedlings. In Zanzibar seven nurseries were maintained, for the production of 50,000 seedlings.

66. Observations were continued on the trials laid down in 1957 and 1958 to test methods of preventing the spread of sudden death disease. There is now some evidence to suggest that trenching may be effective, but definite conclusions would still be premature. It is also too early to say whether the treatment applied for the prevention of "slow decline" are effective, but all the young trees remained healthy.

COCOA.

67. A programme of cocoa development was begun in 1959 with the sowing of as much forastero seed as could be made available from the Department's trees at the appropriate time. The majority were perforce planted in beds, but when "whalehide" pots and pots made from polythene sleeve became available these were used for direct sowing of the seed. In all, some 110,000 seedlings were raised at seven nurseries in Zanzibar and five in Pemba. Following a sustained programme of encouragement through various media, some 236 growers in Pemba (most of them from the south) and 116 in Zanzibar applied for seedlings. All applications were examined critically and the plots were inspected for suitability before allocations were made. In all, 164 people received seedlings, 103 in Pemba (where the demand for seedlings could not be met) and 61 in Zanzibar. The seedlings were issued free and the fields were marked out by the Department's staff without charge. A total of 101,112 seedlings were issued to the public, of which 58,393 were distributed in Pemba

and 42,719 in Zanzibar. A further 6,977 seedlings were planted in demonstration plots in the two islands. Most of these plantings were made at a spacing of 12 feet by 12 feet or at 22 feet by 8 feet (with or without additional infills) when planted between rows of clove trees; thus, some 335 acres of cocoa were planted by private individuals and 23 acres in demonstration plots.

68. The cocoa established itself well but in most cases was severely hit by the intense drought which developed from July. By the end of the year losses had reached 50 per cent. in some instances in Zanzibar but were less in Pemba. Generally it was observed that cocoa seedlings were better able to survive the very dry conditions than were clove seedlings. As was expected, leaf-eating beetles (Chrysomelids) attacked the young seedlings in almost all areas. All plots were sprayed at least twice before the end of the year, using D.D.T. except during the first spraying in Zanzibar, when dieldrin was used. The spraying was undoubtedly of great value but difficulty was sometimes experienced in treating the seedlings sufficiently quickly to prevent the beetles doing serious damage and the lack of rain did not help the plants to recover from defoliation. In future, growers will have to inspect their fields at frequent intervals and report as soon as there is any sign of insect infestation.

69. In October a cocoa development scheme was approved by the Secretary of State, providing for the expenditure of £87,927 during the five-year development period. Eighty-five per cent. of the expenditure incurred will be met from Colonial Development and Welfare funds. The scheme provides for the distribution of nearly 2½ million seedlings, the marking out of growers' plots, the operation of a free spraying service and arrangements for fermenting and marketing during the early stages.

70. The target for the 1961 distribution is 100,000 seedlings in each island. It had been hoped to raise all these seedlings by planting the seed directly into black polythene bags, but a dock strike in the United Kingdom greatly delayed their arrival. To relieve the situation the Department made nearly 100,000 bags in the laboratory from polythene tubing but most of the seedlings had to be established in beds for transplanting into the black bags after they arrived. By the end of the year applications had been received for 60,000 seedlings in Pemba and 74,800 in Zanzibar.

71. The Cocoa Development Scheme also provides for the planting of 65 acres of cocoa on Government plantations. (See Part II, section 11 of this report.)

72. The testing of cocoa growing under a variety of conditions at Kizimbani was continued and expanded. The manurial trials laid down in 1956 and 1959 were maintained and a spacing trial was planted. The cocoa planted under coconuts in late 1959 made exceptionally good growth and some five acres of poorly grown cloves were interplanted with cocoa. Eleven strains of Upper Amazon cocoa and one of Amelonado, planted in late 1958 and transplanted into the field in April 1959, continued to grow very well indeed and a number of these plants produced their first pods at the end of 1960; an Amelonado plant was the first to do so.

73. Exceptionally strong winds occurred between July and October which, coupled with the lack of rain, produced conditions of severe desiccation. Young cocoa trees exposed to the wind suffered damage to their leaves as did bananas and the necessity for providing cocoa with adequate protection from wind was clearly shown. It was also clear that cocoa can resist drought at least as well, if not better than, citrus and can recover rapidly when conditions



A cocoa tree bearing well after four years in the field.



A cinnamon hedge makes an excellent windbreak for cocoa.



A two-year old cocoa tree grown from a cutting. It is four feet high and is bearing its first crop.

improve. Observations made during the year also support our views that, provided cocoa trees are protected from wind, they will grow better for receiving plenty of sunlight.

74. Mealy bugs were troublesome on young cocoa at Kizimbani, causing distortion of the branches. They were more prevalent where the plants had been sprayed with D.D.T. to control leaf eating beetles and spraying was consequently kept to a minimum. Various control measures were and are being tried.

75. Strap-shaped, sickle-shaped and twisted leaves were observed on young plants during their first year in the field and on nursery plants. The condition was due to zinc deficiency and the plants responded well to a foliar spray of 1 per cent. solution of zinc sulphate. Iron deficiency was also observable in young trees and nursery seedlings at Kizimbani and elsewhere. Investigations of nutrient deficiencies of cocoa are described in Part II, section 12, of this report.

76. The Department continued to harvest, ferment and prepare free of charge the cocoa of private growers in Zanzibar, of whom there are about twenty. The 1959-60 crop amounted to 1,437 lb. of dried cocoa beans which, added to the 1,572 lb. of the Department's production, was sold in the United Kingdom through the Clove Growers Association. Of the total, 2,299 lb. was criollo cocoa and 710 lb. forastero. Prices of Shs. 240/- and Shs. 230/- per cwt. in bond London, respectively, were realised.

COCONUTS.

77. The Copra Board again financed the production of coconut seedlings raised by the Department at eight nurseries in Zanzibar and seven in Pemba. To meet an increasing demand the Copra Board in 1959 approved the production of larger numbers than formerly for issue in 1960 but poor germination in Pemba (20 per cent. only) resulted in failure to reach the target. Germination in Pemba over recent years has averaged 44 per cent. while in Zanzibar it is usually over 60 per cent. The difference is largely due to the fact that well-matured nuts from Government Plantations are available in Zanzibar whereas in Pemba nuts bought from private sources are of poorer quality. There was a heavy demand for seedlings in 1960, with 1,833 applicants in Pemba and 249 in Zanzibar and all available seedlings were sold at 10 cents each, less than a third of their cost. The following numbers were distributed:—

			1960	1959	1958
Zanzibar	..	..	67,937	70,959	71,015
Pemba	..	..	65,783	39,253	34,956
TOTAL	..	..	<u>133,720</u>	<u>105,971</u>	<u>86,710</u>

78. For 1961 issue, 191,000 nuts were planted in 10 nurseries in Zanzibar and 309,460 in nine nurseries in Pemba. In Pemba the purchase of more fully-matured nuts at higher prices and earlier planting (in May and June) resulted in germination reaching 47 per cent. In Zanzibar a figure of 44 per cent. only was obtained owing to the very dry weather.

79. The Copra Board again paid the salaries of two copra inspectors whose duties consisted of advising on the production of good quality copra and the construction of kilns of the Ceylon type. To assist in the construction of kilns the Board provided two masons throughout the year and sold at cost price 65 iron rails and 152 sheets of expanded metal.

80. Following the appointment by the Board of a factory manager from Ceylon with expert knowledge of and experience in the production of coconut by-products, a number of machines for spinning coir fibre, and weaving the yarns produced, were made locally and put into operation. By modernising the manufacture of both yarn and articles made from yarn it is hoped to expand and diversify the coir fibre industry, particularly in the seaboard villages where large numbers of women produce retted fibre and use it for making hand made yarn. Some of the coconuts exported from Zanzibar during the year were shipped in net bags made in Zanzibar.

81. The Colonial Pesticides Research Unit continued to lend the services of an entomologist to conduct research into the control of *Pseudotheraptus wayi*, which is one of the causes of the premature fall of very young coconuts. The Inter-territorial Co-ordinating Committee for Coconut Pest Research met in May. Reviewing the trials that had been undertaken in Zanzibar and at Tanga and Mombasa, members of the Committee expressed the view that control of *Pseudotheraptus* by spraying led to increased yields of the order of 40 per cent. during the first year after spraying but that this was followed by a reduction in the following year. It was thought that this was probably due to a physiological inability of the palms to set large numbers of flowers while they are already carrying large numbers of nuts so that there was increased physiological shedding, or alternatively to reduced flower formation as the result of the increased cropping. It was considered that a 50 per cent. increase in yield over present levels would be required to justify spraying and this appeared to be most unlikely. It was therefore recommended that the work be closed down after completing the year's spraying programme, but that harvest records should be maintained for a further 12 months.

82. A manurial trial on mature coconuts at Chukwani Government plantation was commenced. In this trial farmyard manure or compost and a fertiliser mixture containing nitrogen, phosphate and potash are compared. Observation trials of the effect of night paddocking and grazing of stock under coconuts were also begun.

COFFEE.

83. Following the fall in clove prices in recent years there has been increased interest in coffee. This interest has been stimulated by the Department's propaganda, and the numbers of coffee seedlings raised in the Department's nurseries have been greatly increased. All coffee seedlings were sold at 10 cents each. The numbers issued in 1960 and recent years were as follows:—

			1960	1959	1958
Zanzibar	..	..	17,090	11,126	14,404
Pemba	..	..	37,699	4,398	10,415
TOTAL	..		54,789	15,524	24,819

Some 1,700 seedlings were left in the nurseries in Zanzibar and 7,000 in Pemba. For 1961 distribution it is planned to have 50,000 seedlings available in each island.

84. At Kizimbani the very great value of banana mulch in increasing coffee yields was again amply demonstrated. Mulching has now given significant increases for six consecutive years. Banana mulch was very much more effective than coir dust mulch which may even be deleterious in some circumstances. In a variety trial the three varieties *C. robusta*, *C. excelss* and *C. liberica* all made good growth in this third year after planting and all produced a crop,

the *C.robusta* crop being the largest. Three-quarters of an acre of *excelsa* coffee which is some 15 years old yielded nearly $4\frac{1}{2}$ tons of fresh cherries per acre which, at a conversion rate of 8.2:1 and a price of Shs. 2.50 per lb. of dried coffee beans, is equivalent to a gross yield of Shs. 3,008 per acre.

85. A survey of coffee trees in Pemba revealed that there were 18,479 trees of which 13,083 were bearing and 5,396 were still young. The trees were owned by 322 people, 245 of whom had fewer than 50 trees. The numbers of trees owned by individual people varied from 1 to 1,200 but only six people had more than 400 trees each. The main harvest occurred from July to October. Picking rates ranged from 15 cents to 20 cents per pishi of fresh berries (about 4 to 5 cents per lb.) and dry coffee beans were sold at from Shs. 2 to Shs. 2 and 50 cents per lb. Departmental staff in Pemba urged the adoption of proper pruning practices to control excessive non-bearing growth.

DERRIS.

86. In 1959 the demand amongst Zanzibar farmers for rooted cuttings exceeded the supply and 150,000 cuttings were therefore planted in nurseries for issue in 1960. At the same time the Clove Growers Association, which handles the crop, began to experience increasing difficulty in disposing of the stocks which they held and it became necessary to stop giving active encouragement to the planting of derris. In the event, only 10,870 rooted cuttings were issued during the year.

87. In a growth period trial at Kizimbani derris harvested after 24 months yielded 1,336 lb. of dried root per acre compared with 871 lb. from derris harvested at 18 months. Harvesting at 30 months gave 1,228 lb. per acre. No further experiments were laid down.

GINGER.

88. Half an acre of ginger planted at Kizimbani failed to grow satisfactorily and the majority of the plants died during the drought.

GROUNDNUTS.

89. Variety and manurial trials were conducted at Kizimbani but the very dry weather precluded the obtaining of very satisfactory results.

KUDZU.

90. There was again an overseas demand for seed of Kudzu (*Pueraria phaseoloides*) but the very dry weather reduced the crop considerably and some 355 lb. only were exported.

MAIZE.

91. It was a poor season at Kizimbani for maize but in a trial of farmyard manure applied at the rates of nil, 2, 4, 6, 8 and 10 tons per acre to white maize, the manure produced increases in crop which were significant comparing 2 tons with nil, 4 tons with 2 tons and 10 tons with all the lower rates.

92. Stem borers sometimes cause serious damage to maize in the coral areas. At Makunduchi the application of endrex once a month reduced the infestation from about two borers per plant to one borer for every two plants. Applications at fortnightly intervals gave no more effective control but weekly applications gave slightly better control. The depredations of crows prevented the collection of accurate yield records.

NUTMEGS.

93. Nutmegs planted in 1959 and 1960 made poor growth and most of those planted at Kizimbani and in demonstration plots in the districts failed to survive the dry weather. It is clear that nutmegs would be a very difficult crop to establish under Zanzibar conditions of periodic rainfall shortage and a minimum of cultural attention. Germination of the seed is also very poor. Four mature trees at Kizimbani yielded an average of 24.2 lb. of nuts per tree compared with 32.7 lb. in 1959.

PATCHOULI.

94. The few patchouli plants which were set out in 1959 made rather poor growth but were further propagated by cuttings.

PINEAPPLES.

95. The Department continued to purchase pineapple suckers from growers at 4 cents each and re-sell at the same price to those in need of planting material. Some 24,700 suckers were distributed in this manner, of which over 13,100 were sent to Pemba.

96. At Kizimbani the use of a coir fibre dust mulch, applied to a depth of 3 inches once only shortly after planting, practically doubled the yield of pineapples over three years of harvesting. The mulch also controlled weed growth during the first year. Producing more pines of greater average weight, the coir mulch gave an increased gross return of Shs. 1,361/20 per acre over the three years, or Shs. 394/74 per acre per annum, raising the annual gross return from Shs. 412/50 per acre to Shs. 807/24 per acre.

RICE.

97. The customary acreage and yield surveys were carried out by counting the rice plots, measuring by pacing every tenth plot, and weighing the freshly cut grain from 1 square yard quadrats in numerous plots of average appearance in each rice growing area. During the survey in Pemba, by collecting 775 samples from all areas, a total of 43 different varieties were obtained. Of 20 varieties recorded from valley areas, the commonest variety "Malikora" accounted for one quarter of the samples; in the plains 12 varieties appeared to be equally common; of the six varieties planted on hillsides "Mpunga mweupe" was the commonest.

98. Privately owned rice plots were again used to demonstrate the value of fertilizers, in both the 1959/60 and the 1960/61 seasons, and it is symptomatic of the growers' increasing understanding that there is now no difficulty in obtaining such plots for demonstrations. Of seven plots in Pemba and twenty plots in Zanzibar treated during the 1959/60 season, the fertilized half in every case gave a greater crop than the unfertilized, the increase exceeding 20 per cent. in every field except one situated in a fertile irrigated valley. The manures caused an average increase of 64 per cent. in Pemba and 74 per cent. in Zanzibar. Details of yield in lb. paddy per acre are as follows:—

	Zanzibar lb.	Pemba lb.
Average yield of fertilized plots	2,270	2,119
Average yield of unfertilized plots	1,301	1,296
Average increase due to fertilization	969	823
Lowest increase due to fertilization	63	302
	Shs.	Shs.
Cost of fertilizers	58	58
Value of average increase in paddy at 25 cts./lb.	242	206
Value of lowest increase in paddy at 25 cts./lb.	16	76



A coconut nursery shortly after planting.



Malayan dwarf coconut.



Ylang ylang.



Ploughing rough land for coconut planting.

99. Superphosphate and sulphate of ammonia were made available for sale at cost price at most rice growing centres in Pemba and Zanzibar and field staff explained how each fertiliser should be used, and in many cases assisted directly in the application. During the 1959/60 rice season sales of fertilizers amounted to 5.1 tons of single superphosphate (Zanzibar 3.5 tons, Pemba 1.6 tons) and 1.9 tons of sulphate of ammonia (Zanzibar 1.7 tons Pemba 0.2 tons). Rather smaller amounts appear likely to be sold during the 1960/61 season for a small clove crop has resulted in a general shortage of cash.

100. The Trinidad varieties D/52, Red American and Sughandi, which had previously been tested at Kizimbani and found acceptable, were grown in both Pemba and Zanzibar in demonstration plots in comparison with good local varieties. In Zanzibar D/52 gave the highest yields averaging 2,181 lb. per acre compared with the local variety Mngazija which gave 1,395 lb., the lowest yield. In Pemba Red American gave the highest yield, 2,337 lb. per acre compared with 2,277 lb. by the local variety Moshi. During the 1960/61 season seed of these varieties was again made available for sale.

101. To encourage co-operation and the use of fertilisers and mechanical equipment, the Department prepared, fertilised and sowed an area of rice land before dividing it amongst a number of rice growers for them to maintain and subsequently repay all costs. This is described more fully in the section on mechanical cultivation.

102. Experimental work at Kizimbani included the testing of Sierra Leone varieties and making individual plant selections from the Trinidad varieties mentioned above. Fertiliser and planting distance trials were also undertaken. It was again proved that it pays to plant rice at six inches spacing rather than nine inches or wider, in the rather wet area of Kinuni Moshi.

SWEET POTATOES.

103. In a demonstration of the use of compost at Makunduchi farm a quarter of an acre of potatoes treated with compost yielded 1,728 lb. of tubers while the quarter acre which received no compost gave 980 lb. At Kizimbani the use of farmyard manure doubled the yield of sweet potatoes.

TOBACCO.

104. A sample of the 1959/60 experimental Solouk crop—the first to be produced—was sent for appraisal and it was reported that the leaves were too large and leathery, the aroma too pungent and the taste too bitter and strong. These are defects which are likely to arise as a result of the plants being grown too far apart on land being cropped for the first time after clearing. A comment that the leaf had air-dried as opposed to sun-dried characteristics stemmed from the fact that late planting resulted in the crop being harvested during the late rains, necessitating over-long periods under shelter. For the 1960 trials home-grown seed was used and it was possible to start in good time. The seed beds were sown in early May. The germination was excellent and transplanting was done from early July into an acre of newly cleared land and an acre of second year land, both plots being in the coral areas. The very dry weather which followed transplanting—there was only $4\frac{1}{2}$ inches of rain from July to December at Makunduchi—necessitated watering in the field and the stand was inevitably somewhat uneven, though closer planted than in the previous year.

105. Three curing racks of 48 ft. length and 4 ft. width and two of 24 ft. by 4 ft. were used and harvesting began in September. By the end of the year, 1,535 strings of 4 ft. length had been cured and harvesting was still continuing.

The leaves were much nearer to the desired size than they were in 1959, particularly those harvested from the second-year land, and there is hope that planting the tobacco in the second or third year of the rotation may enable an acceptable leaf to be produced.

YAMS.

106. Yams were grown at Mkwajuni and Makunduchi farms to show the value of compost and to test the value of applying coir fibre dust and artificial fertilizers. The results are not yet conclusive but in general lead to the view that much of the effect of the compost, which is superior to all other treatments, is due to its water-retaining capacity. Mulches do not have quite the same effect, however, even if artificials are added, but in a trial of residual effects, complete artificials (N, P and K) applied in the previous year gave the highest yield whereas the compost had no effect on the crop of the second planting.

YLANG YLANG.

107. Regular harvesting of flowers was undertaken from the eight acres of ylang ylang at Kizimbani. When sufficient quantities were obtained the flowers were distilled at the Clove Growers Association's distillery under the supervision of the Government Chemist. Twenty-six distillations were undertaken during the year and 23.63 lb. of oil were obtained.

4. Mechanical Cultivation

108. Tractor cultivation services continued as part of the territory's development plan, at first as the Rice Scheme and then from 1st April, as the Mechanical Cultivation Scheme within the 1960-64 development programme. Under the new name the same work is being continued without expansion until the end of the 1961/62 rice season, when the new administration will decide whether the Scheme should be wound up or expanded. No additional tractors or equipment were obtained during the year and the staff remained unchanged.

109. The year's work showed some improvement on that of 1959, and the total cultivations in Zanzibar, amounting to 1,768 acres compared with 1,288 acres in 1959, were the highest since 1956 when 2,013 acres were cultivated. The financial position also improved, the overall loss during the year on the running of the scheme— including all salaries, allowances, wages, running costs and depreciation on buildings and machinery—falling from £5,005 to £4,753. This figure is equivalent to a loss of Shs. 53/75 per acre or Shs. 13/16 per hour for all types of cultivation undertaken. Comparable figures for 1959 were Shs. 77/72 and Shs. 22/54. The charges for cultivation remained unchanged. There was a sliding scale for each type of cultivation with rates varying inversely with the acreage. While the average charge for ploughing was Shs. 44/53 per acre, it cost the Scheme Shs. 97/70 per acre, thus incurring a loss of Shs. 53/17 per acre. Similarly disc-tilling cost Shs. 82/41 per acre but was charged at an average rate of Shs. 24/85, losing Shs. 57/56 for each acre tilled.

110. The basic reason for the recurrent financial loss was again the lack of sufficient steady, worthwhile work throughout the year. The tractors are fully extended for no more than two to three months of the year. The demand for tractors for rice cultivation is limited mainly by the cash in rice growers' hands and it thus fluctuates with the clove crop. Cultivation in the upland areas, between the rice seasons, has been dependent on less than half-a-dozen plantation owners. Most of the plantation owners, however, are content to accept minimal crops from neglected plantations and abhor expenditure on

cultivation of any kind. Where work is obtained in coconut plantations, the plantations have usually been neglected for a number of years, and are covered with a heavy growth of bushes. Under these conditions tractor and implement wear is high, breakages are numerous and costs are inflated. In rice fields, on the other hand, breakages are few but costs are high because of the very small sizes of the plots. It has still not been possible to persuade rice growers generally to join together for the purpose of tractor ploughing although it is profitable for them to do so. During 1960, however, some progress was made. Thus while the average size of rice plots ploughed dropped from 1.02 acres in the 1958/59 season to 1.00 acres in the 1959/60 season, it rose during the first half of the 1960/61 season to 1.58 acres. Average fuel consumption per acre cultivated, at 3.62 gallons, was the lowest figure so far recorded.

111. In an endeavour to stimulate rice growing by mechanical means and co-operation amongst rice growers and to test out a method of doing mechanical work on credit, ten acres of rice land belonging to the Department near Kizimbani were ploughed, prepared, fertilized and sown with rice seed. When the seed had germinated the ten acres were divided into 20 half-acre plots and 20 growers were invited to take them over, on the understanding that they would pay back the costs of the seed and fertilizers and meet the normal charges for tractor cultivation when they had harvested the crop. Twenty prospective growers immediately came forward, maintenance of the plots was satisfactory, and all were able to pay off their debts and have plenty of rice left over for themselves. The only difficulties experienced were in getting the growers to apply a second fertilizer dressing at the correct stage, and, in some cases, in persuading the grower to sell part of his crop at a time of low prices in order to meet his debt rather than wait until the next planting season came round when prices would have risen. For the 1960/61 season on area of 15 acres was prepared and the 30 participants, who are mostly labourers at Kizimbani farm, have expressed a wish to pay off their debts in monthly instalments beginning when they take over the plots.

112. The total acreage cultivated mechanically in Zanzibar during the 1959/60 rice season amounted to 435 acres ploughed, 188 acres disc-tilled, 21 acres drilled and 17 acres fertilized, a total of 660 acres compared with 646 acres in the previous season. This total represents about 4.5 per cent. of the total rice area planted in Zanzibar (compared with 6.6 per cent. in 1958/59 and 39.9 per cent. in 1957/58). Some 455 people from the three areas of Cheju, Chaani and Mwakaje paid for 427 plots to be cultivated.

113. During the 1960/61 rice season, which opened in September and was still continuing in the northern areas at the end of the year, some 475 people had had 366 plots cultivated amounting to 898 acre of cultivations. It is expected that the figure will reach 1,000 acres by the end of the season.

114. In the intervening period plantation work amounted to 332 acres ploughed, 105 acres disc-tilled and 5 acres dealt with by the Marden weed cutter, a total of 442 acres only, compared with 918 acres in the previous year.

115. In Pemba three tractors operated during both rice seasons but had little or no work to do between the rice seasons. Total cultivations during the 1959/60 season were 170 acres of ploughing and 23 acres of harrowing. Of the ploughed acreage, 144 acres were in the Ole and Vitongoji areas. The total showed some improvement on the work done in the previous season which amounted to 123 acres in all. During the first two months of the 1960/61 season, to the end of December, 84 acres of rice land were ploughed.

5. Stock Husbandry

STOCK IMPROVEMENT.

116. The Kizimbani dairy herd, which consists of local Zebu with admixture of Boran blood, continued to be managed on the lines followed in recent years. The total number in the herd rose from 311 at the end of 1959 to 338 at the end of 1960. There were 123 births during the year, 50 animals were sold and there were 38 deaths, the majority of which were due to tick-borne diseases.

117. The culling standard remained at 2,600 lb. of milk in either of the first two lactations, all cows being milked out completely by hand and the calves bucket fed. Fifteen females were culled from the herd for failure to reach the required standard. One hundred and eighteen lactations were completed during the year compared with 95 in 1959 and 76 in 1958. The average milk yield in 305 days of these lactations fell to 1,722 lb. compared with 1,932 in 1959. The milk index, which represents pounds of milk per cow in milk per day, fell from 7.3 to 6.3 lb. This continues the trend that has been shown over the past three years and which is due partly to the fact that the daughters of some rather unsatisfactory bulls have been coming into the herd. These will have been largely weeded out by the end of 1961, when daughters and grand-daughters of bull 399 will comprise the bulk of the heifers coming into the herd.

118. Another reason why the milk index has fallen during the last two or three years is that the milk yields of some of the high yielding cows have fallen. This is believed to be because of the deterioration of the Kizimbani pastures through overgrazing. Squatters who live on and near the Kizimbani plantation have recently increased their herds considerably and other squatters who in the past have grazed their cattle on privately owned plantations have, through political differences with plantation owners, been forced to graze their cattle elsewhere and have in consequence brought them to graze on the government plantations. This is a serious matter as the high milk producing cows of the Kizimbani herd are not producing milk in proportion to their capabilities and the assessment of their capabilities for selection and breeding is being rendered difficult or impossible. The remedy lies in erecting fences around the Kizimbani pastures to exclude privately owned cattle, to prevent over grazing, and then to adopt measures to eliminate weeds and encourage the growth of grasses while grazing is being controlled.

119. The Boran bull, No. 399, who is now about 16 years old was used as much as possible, mainly through A.I. He sired five of the calves born in 1960 compared with 16 in 1959. Eleven other bulls were in service during the year. Three of these were mature sons of 399, which have now been in use for two to five years, the remainder were young bulls under test for the first time.

120. Butter milk powder and proprietary composite dry foods were trial fed to calves as substitutes for milk. The dry food was particularly satisfactory and its use will be extended. Sales of milk, cream, ghee and livestock amounted to £3,003. Excluding staff salaries, expenditure totalled £2,867.

121. In Pemba four Kizimbani bulls were at stud throughout the year for the provision of free services for private cattle owners. In all, 85 services were performed. Four high yielding local cows were purchased in Pemba in order to obtain from them, by artificial insemination, bull calves sired by the Boran bull 399 or his progeny, which would be able to acquire resistance to East Coast fever on exposure to the disease while still young. Such animals, when mature, could be sent as stud bulls to all parts of Pemba without risk.



Bull 399 "Ndurumo", at 16 years of age.



Moveable individual calf pens, as used at Kizimbani.



Heifers on the Tunguu ranch. *(Photo. by Gordon R. Schlubatis).*



Sheikh Rashid -Amour night-paddocks his herd under citrus and coconut palms.
The bull has Indian, European and local blood.

122. The A.I. service continued in both islands, but has not made the progress hoped for. The limited response is due to the fact that in most areas there is no shortage of bulls and the operation of the A.I. service involves the cattle owner in some additional work in that he may have to make special arrangements both to keep his cow away from local bulls and to contact the service headquarters immediately it comes on heat. The value that is placed upon the Kizimbani blood by the average stockowner is not sufficient to induce him to go to these lengths. Nevertheless, 27 privately-owned cows and heifers were inseminated in Zanzibar and 22 in Pemba. In addition, 26 departmental animals in Zanzibar and two in Pemba were inseminated. Bull 399 and his two sons 712 and 727 were used exclusively. Assuming that the cows did not have unrecorded access to other bulls, the percentage of effective inseminations was 12.5 in the case of bull 399, 75.0 with bull 712 and 77.6 with bull 727.

STOCK RAISING (CATTLE RANCHES).

123. The Department continued to operate cattle ranches at Hanyegwa Mchana, Tunguu and Pangeni, as part of the development plan. The objects are to investigate how formerly unused coral area grasslands of Zanzibar can be made productive and what measures are needed to maintain healthy herds in the face of attacks by trypanosomiasis and other diseases. In spite of an unprecedented shortage of rainfall—Hanyegwa Mchana received only $5\frac{1}{2}$ inches from July to December inclusive—and a consequent reduction in grazing, the animals maintained good health throughout the year. The calf crop was satisfactory and mortality was low. The reduction in grazing emphasised the fact that Hanyegwa Mchana and Tunguu had become overstocked and that the three ranches taken as a whole had almost reached saturation point. The opportunity was taken to cull a relatively large number of poorer type cows and young stock.

124. The Hanyegwa Mchana and Tunguu ranches, sited on true "uwanda" or coral grasslands, continued to be used as the breeding centres, while Pangeni carried the growing and fattening bullocks and young bulls from Tunguu. Owing to the shortage of grazing at Hanyegwa Mchana, where the cattle are dipped as a precaution against East Coast fever, 20 young animals were transferred from there towards the end of the year to Pangeni, where the cattle are sprayed, to test whether such transfers could be undertaken without serious loss. Management was on the same general lines as heretofore, the animals being grazed throughout the ranches during the day, in four or five class herds at the breeding ranches and in two herds at Pangeni. At night they were either enclosed by electric fences or turned into permanent paddocks. The former method is useful for improving the ranch grazing but the latter saves labour. At Hanyegwa the herds had to be grazed in a rice plain and in rough bush grazing up to three miles from the ranch when grazing became short. Furthermore, supplementary feeding of the bulls with cassava, and of down calvers and sick animals with cut grass was necessary towards the end of the year.

125. Five Boran bulls from Kenya were in use at Hanyegwa Mchana throughout the year. At Tunguu one of the four surviving Tanganyika Boran bulls died of East Coast fever in January and it was not until December that it was possible to bring in two Tunguu-bred Boran half-cross young bulls, sired by the Kenya bulls.

126. At the end of the year there were 814 head of cattle at Hanyegwa, 592 at Tunguu and 282 at Pangeni, making a total of 1,688 as compared with 1,636 at the end of 1959. A total of 276 animals were sold during the year of

which 61 were culled cows and 191 were bullocks, the remainder being mostly casualties. Not all of the bullocks were fully finished, a number being sold at two to three years of age to relieve pressure on the grazing. These fetched about Shs. 250 each as compared with Shs. 400 for fully fat bullocks of four to five years of age. Seven heifers were also sold from Hanyegwa, fetching Shs. 300 each. Total sales amounted to £3,780.

127. A total of 368 calves were born compared with 380 in 1959. At Hanyegwa Mchana the calving percentage rose to 80.3 per cent., a not unsatisfactory figure, while at Tunguu it fell to 71 per cent. due to the shortage of bulls at that ranch. The average birth weight for both sexes at both ranches again rose, from 38.6 lb. in 1959 to 39.4 lb. in 1960. The increase was entirely due to increased birth weights at Tunguu, where the first calves from the Tanganyika bulls were born and averaged $2\frac{1}{4}$ lb. more than those born at Hanyegwa. This result was unexpected since the Tanganyika bulls were rather smaller than those from Kenya, which sired the 1959 crop of calves.

128. Calf mortality remained low, at 4.3 per cent. at Hanyegwa and 2.8 per cent. at Tunguu. Adult mortality was also very low at Hanyegwa and Tunguu, being 1.7 per cent. and 2.5 per cent. only, but at Pangeni it reached 6.4 per cent. The principal causes of mortality at Pangeni and Tunguu were the tick-borne diseases, East Coast fever and babesiosis. These diseases accounted for 13 deaths at Pangeni and 10 at Tunguu. In addition some half dozen animals were slaughtered at Pangeni while in a moribund state suffering from East Coast fever. Only two animals, however, succumbed to the disease at Hanyegwa Mchana.

129. Although there were only seven deaths from trypanosomiasis (four at Tunguu and three at Hanyegwa), control of the disease is still a major factor in the success of the ranches. Antrycide prosalt was administered at all three ranches during January or February but late-arrival of supplies prevented further prophylactic treatment before the end of the year. In July the Hanyegwa herd showed infection for the first time for two years and the infection rate increased at Tunguu from August onwards. Nevertheless it did not exceed 3 per cent. at Hanyegwa and 7 per cent. at Tunguu. In contrast, over 13 per cent. had been infected at Tunguu in October and November of 1959. The main cause of the reduction at Tunguu was the clearing of bush within a belt 200 to 300 yards wide and nearly two miles long around that part of the ranch where tsetse flies were found in greatest abundance and were known to be breeding. A fence prevented the cattle from entering the cleared area.

130. To compare the value of the grazing at Pangeni, where the grasses include *Hyparrhenia* spp., *Digitaria* spp., *Panicum maximum* and *Imperata cylindrica*, but no *Heteropogon*, with that at Tunguu where the dominant grass is *Heteropogon contortus*, ten pairs of animals born at Tunguu in 1957, 1958 and 1959 were split between the two ranches and their growth rates recorded. Two of the Pangeni animals died but the remainder showed an average increase of 132 lb. each during the 12 months compared with an increase of 99 lb. by the other individuals of each pair at Tunguu. It was noteworthy, however, that during the rains, when grass was plentiful at both ranches, the cattle put on more weight at Tunguu. A complicating factor might be the presence of *Stomoxys* which are abundant at Pangeni during the rains.

131. The irrigation of an area of about six acres at Tunguu was begun. Water is pumped from a well dug in an adjacent natural depression and applied to the land by parallel overhead spray lines. Elephant grass and *Panicum maximum*

were planted and the first cut was fed to down calving cows at Hangeywa at the end of the year. The intention is to investigate stall feeding in the fattening of stock, particularly in the finishing stages.

132. The goat herd at Tunguu expanded satisfactorily. The four nannies each kidded twice during the year, producing 14 kids between them. The kids born in January and February themselves kidded in November, just over ten months from the date of their birth.

133. Staff and labour quarters at Pangenj were completed early in the year and the well, deepened to 95 feet, provided a steady supply of water. The wind at Pangenj, however, has not been so strong and consistent as on the other ranches.

6. Veterinary Activities

134. The Veterinary Section of the Department provided services at five centres in Pemba and four in Zanzibar and, in Zanzibar, operated a travelling clinic which made regular weekly visits to country areas, treating cases en-route and at village centres. The section is responsible for the organisation and supervision of dipping and spraying. The Zanzibar quarantine station was in continuous use throughout the year but the Pemba quarantine was unused, as no livestock was imported.

135. Charges for veterinary attention are levied in all cases except where the stock owner is clearly unable to pay. Provision was made for increases in these charges at the end of the year.

136. There were two outbreaks of foot-and-mouth disease during the year. Type SAT 2 appeared in the dairy herds kept at Mtoni and the Hindu Gaushala at the start of the main rains, in April. The disease was comparatively mild. Amongst the grade dairy cattle at Mtoni 230 animals contracted the disease. Almost at the same time type A appeared in a herd of slaughter cattle in the quarantine station. Slaughter was expedited and the disease did not appear outside the quarantine station. The two outbreaks lasted for about one month only.

137. Anthrax was diagnosed in a goat which died suddenly in the quarantine station during February. The animal was in a herd of goats and sheep imported from Tanganyika for slaughter. The herd was segregated in a concrete-floored shed and the remaining animals were inoculated with anthrax spore vaccine obtained from Kenya, and released for slaughter 14 days later.

138. A large number of fowls in Pemba succumbed to an ailment showing the clinical features of Newcastle disease. This diagnoses however could not be confirmed although pathological material was examined at Kabete.

139. At the end of the main rains a large number of cattle at and near Kizimbani were affected with diarrhoea accompanied by loss in condition and milk yield. The condition was afebrile and no micro-organisms were found in blood or faeces, which was greyish-green, watery and very unpleasant in smell. The herbage was investigated for evidence of copper deficiency which is known to be a cause of a syndrome of this nature. Analyses of grass leaves and roots from the Kizimbani grazing areas showed low copper concentrations ranging from 2.6 to 6 parts per million. Affected animals treated orally with copper sulphate solution at a dosage of 1 gm. of copper each day made rapid recovery. The soil was not analysed for excess molybdenum, but this may well be the first case of 'teart' recorded in Zanzibar.

140. The number of clinical cases treated at the veterinary centres and by the travelling clinic and district staff throughout the year were as follows:—

		Cattle	Goats and Sheep	Donkeys	Dogs and Cats	Poultry	Others
Zanzibar	.. ..	3,141	328	348	620	1,703	6
Pemba	.. ..	809	60	11	114	1,080	5
1960 Total	.. ..	3,950	388	359	734	2,783	11
1959 Total	.. ..	3,800	364	348	945	7,304	49
1958 Total	.. ..	4,146	364	269	746	2,751	13

141. In Zanzibar, the number of cattle treated rose by over 200, due to larger numbers being treated for trypanosomiasis, which accounted for 1,603 cases or half the total. The next most common ailments to be treated were wounds (374 cases), worms (350 cases) and tick-borne diseases (296 cases). There was one case of tuberculosis, which showed tubercle bacilli in the swollen parotid gland. In Pemba the chief ailment amongst cattle was wounds, 284 cases of which were treated. Amongst the 32 other morbid conditions treated there were 168 cases of ophthalmia, 54 of worms, 45 of three day sickness and only 32 of tickborne diseases, mainly babesiosis and anaplasmosis.

142. In both Zanzibar and Pemba wounds were by far the commonest condition treated amongst goats, sheep and donkeys. Worm cases were also common and there were 57 cases of trypanosomiasis in donkeys and 17 in goats. There were 19 cases of dog distemper, all in Zanzibar. Of the poultry diseases in Pemba, coccidiosis and helminthiasis accounted for nine-tenths of the cases, the remainder being mostly fowl pox. The commonest ailments treated in Zanzibar were coccidiosis, coryza, aegyptianellosis, helminthiasis and avitaminosis. There were 80 cases of fowl cholera.

143. Prophylactic treatments given during the year included 1,395 doses of antrycide prosalt against trypanosomiasis, 298 vaccine inoculations against Newcastle disease, 90 against anthrax, 18 against distemper, 10 against rabies and two against African horse sickness.

144. The cattle census carried out during the year indicates that there has been an increase of 68 per cent. in the cattle population of Zanzibar island during the past nine years, while in Pemba the increase has been 45 per cent. The larger increase in Zanzibar is probably due to the successful treatment of clinical cases of trypanosomiasis. Prophylactic treatment against trypanosomiasis has been confined to the Department's herds at the three ranches. The efficiency of the method is not very easy to determine. It is true that regular use of antrycide prosalt at Hanyegwa was followed by the obliteration of the disease in the herd for a period of two years and that when the prosalt was not administered for a period of more than five months, trypanosomiasis reappeared. At Tunguu, however, trypanosomes were found in the blood of 47 animals out of 589 only two months after prophylactic inoculation. Here, five infected animals showed resistance to treatment with antrycide, and Berenil was necessary to break down the condition. Drug-fastness, however, would be surprising at Tunguu since antrycide had been used for a very short time only, the drug previously in use being prothidium. To help to clarify the position a fly survey was undertaken at both ranches during January and February. At Tunguu, 232 flies were caught and 6,557 pupae were collected from the bush on the borders of the ranch. Trypanosomes were seen in the flies. At Hanyegwa Mchana only 30 flies were caught, all of which were free from trypanosomes and no pupae were found. The greater challenge would account for greater incidence of the disease at Tunguu but it would seem that the continued use of antrycide prosalt at Hanyegwa may have suppressed the disease not only in the cattle but also amongst the fly.

145. With the purpose of determining how far *G. austeni* can fly in the open in search of cattle, three cows from Pemba were penned day and night in a paddock the closest point of which was two hundred yards from tsetse bush. After one month one of the cows was infected. It is probable that tsetse flies would not fly as far during the heat of the day.

146. Dipping continued to be practised by the Department at Kizimbani and Hanyegwa Mchana, at stations in Pemba and by the commercial dairymen in Zanzibar. This is still based on a weekly or five-day interval (the latter at Kizimbani) between dippings, for controlling ticks and tick-borne infections. The numbers of privately-owned cattle brought to the dips in Pemba further declined. A free spraying service was again provided in the main cattle areas of Pemba and in some dozen places in Zanzibar, in particular in the Makunduchi mudiria, at Kombeni and at Chwaka. In Zanzibar a weekly service was provided at Kombeni and Makunduchi and a fortnightly one at Chwaka and the more distant places within the Makunduchi mudiria. In Pemba the spraying routine was changed in July to fortnightly instead of weekly intervals in order to avoid any risk of reducing East Coast fever to such an extent that the stock would lose their acquired resistance to it.

147. The spraying services are intended to increase the productive capacity of the livestock by reducing the tick population to a low level without eradicating them. Enough should be left to ensure that all calves are infected with East Coast fever before they are six months old with only a small quantity of inoculum which would probably result in a mild attack of the disease, insufficient to cause death of the calf but sufficient to give it resistance to subsequent attacks. The average numbers of cattle being sprayed during the second half of the year are shown in the following table, in comparison with those of previous years.

			1960	1959	1958	1957
Zanzibar	..	..	1,441	922	909	619
Pemba	..	..	595	843	469	295
TOTAL			2,036	1,765	1,378	914

7. Forestry

148. The main objectives of the Forestry section are: (a) to reserve and establish effective control over the mangrove forests, (b) to exploit two small areas of tropical evergreen forest and follow up with enrichment plantings with trees that will yield high grade commercial timbers, (c) to acquire and afforest land which is not well suited for agriculture, especially in the Zanzibar water catchment area, and (d) by such action to make the Protectorate less dependent on external timber supplies.

149. The area of constituted Forest Reserves was increased to 8,099 acres by the addition of the Jozani Forest Reserve of 484 acres. The area originally intended for reservation at Jozani was 2,146 acres but the balance was excluded after protests had been received from the local inhabitants who claimed that reservation would infringe their rights. This exclusion, from the forestry point of view, is not at all satisfactory as the area consists of tropical rain forest, mostly unproductive, but capable, by planting and proper management, of producing large quantities of Mtondoo (*Calophyllum inophyllum*) and other timber trees which would ultimately benefit the people of the country as a whole. It will take time, however, to educate and persuade the people to this way of thinking. The area which has been reserved was purchased some years ago under the Land Acquisition Decree and is free from any rights.

150. A further area of 38,467 acres of mangrove are under notice of intention to reserve. Enquiries have been held and it has been decided to proceed with reservation subject to certain rights for local communities being written into the constitution orders. These areas have been controlled under the Wood-cutting Decree since 1945 and before the change-over to the Forest Reserves Decree can be effected certain amendments and additions to the Forests Reserves Rules will be required. These are already in draft form.

151. Forest Reserves already constituted may be classified into four main types of forest for management purposes:—

					Acres
(1) Tropical rain forest	..	..	..	..	3,111
(2) Mangrove forest	..	..	..	..	1,463
(3) Inland plantations	..	..	..	..	2,735
(4) Grazing land	..	..	..	..	790
TOTAL	..	..	..	..	<u>8,099</u>

152. Tropical rain forest occurs in Ngezi Forest (2,807 acres) and Jozani Forest (304 acres). The Working Plan for Ngezi Forest prescribes the planting of Mvule (*Chlorophora excelsa*) in cleared lines at 36 ft. spacing after all marketable timber trees have been removed. The area planted in this way to date is 437 acres. During the year the supply of Mvule seedlings failed due to 'damping off' in the nursery, consequently no planting was done. Instead, Mtondoo was intersown at 12 foot spacing between the Mvule in existing plantations. The percentage of germination was disappointing, being estimated at only 50 per cent.; nevertheless, the policy will be pursued of enriching the stand by introducing various kinds of valueable timber trees in addition to Mvule, to establish a mixed stand to be managed on the selection system.

153. Inland forest plantations fall into two main categories (a) those at Kichwele and Walezo (596 acres) where *Casuarina* and *Eucalyptus* are being planted on poor agricultural land for the production of poles and fuel, and (b) those at Dunga and Jendele (1,226 acres) where, partly as a research project, attempts have been made to establish tree growth on coral areas. At Dunga some 230 acres of plantations have been established to date and no further planting has been undertaken during the year. The present policy at Dunga and Jendele is to maintain existing plantations and study the results before attempting any further planting.

154. The Masingini afforestation scheme involves the acquisition of 1,595 acres of degraded agricultural land with the object of establishing tree growth, arresting gully formation, stabilising the soil and safeguarding part of the Zanzibar City water supplies. Progress to date is shown by the following figures:—

					Acres
Land acquired and planted	..	..	..	..	272
Land acquired but not yet planted	..	..	..	..	214
Balance to be acquired	..	..	..	..	1,109

New plantations laid out during the year on Masingini were as follows:—

					Acres
<i>Casuarina equisetifolia</i>	..	..	..	..	18.9
<i>Pinus elliottii</i> and <i>P. patula</i>	..	..	..	..	13.0
<i>Grevillea robusta</i>	..	..	..	..	2.7
<i>Eucalyptus</i>	..	..	..	..	1.6
TOTAL	..	..	..	..	<u>36.2</u>

155. In addition, 42 acres of *Casuarina* plantations were intersown with Mtondoo and 20 acres interplanted with seedlings of the same species. The policy is to introduce trees of kinds that will yield timber of commercial value wherever soil conditions are good enough. The results so far are encouraging but it is evident that *Calophyllum* prefers partial shade conditions during the first few years and may suffer severely from scorching in exposed conditions. Soil moisture conditions are far from being ideal.

156. Grass fires caused serious damage to plantations in two instances. One in Dunga Forest Reserve in August damaged 20 acres of young trees and a lesser fire at Chumbuni in October affected 7 acres. Minor fires also occurred at Jendele and Jozani. In all cases except Jozani the fires occurred during periods of drought and spread in from adjoining shambas jumping across the cleared fire traces. In Jozani the fire appeared to have been caused maliciously.

157. In Ngezi Forest 35 young Mvule trees were maliciously damaged and in Jozani Forest 10 trees were illegally felled and removed. In neither case were the culprits traced. Regular patrols in mangrove areas were carried out and 18 cases of illegal felling of poles in "Closed Areas" were reported and taken to Court. Fines amounting to Shs. 299 were imposed and one offender was imprisoned for 20 days.

158. There was no production of high grade timber for building construction from the inland forests of the Protectorate. The contractor working in Ngezi Forest removed 1,277 tons of logs of Ngulele (*Antiaris* spp.) and Msufi mwitu (*Bombax* spp.) for export to Europe for use in plywood manufacture.

159. The following table shows the numbers of scores of mangrove poles for which cutting permits were issued during the year.

	Zanzibar (Chwaka Bay only)		Pemba
Nguzo	1,404	..	1,740
Boriti	204	..	1,810
Makombamoyo	1,196	..	171
Miamba	—	..	1,779
Mapau	2,870	..	3,771
Fito	17,810	..	19,325
Number of permits	405	..	497
Estimated total out-turn in tons of 50 cu.ft. ..	1,059 tons	..	1,911 tons
Estimated value at main markets	£3,690	..	£6,980

The permits were issued under the Woodcutting Decree, 1945. For those issued for Chwaka Bay a nominal fee of one shilling per permit is charged and in addition, at the time of removal, a ten per cent. levy in kind is made. The sales of produce thus collected realised Shs. 2,138 for credit to the local council. No fee was charged or levy made in respect of other areas of Zanzibar or Pemba.

8. Fisheries

160. The fisheries development scheme was again extended by including it in the new Agricultural Development scheme covering the five years from 1960 to 1964 inclusive. The main objects of the scheme are to develop the industry in all its aspects, e. g., by investigating and introducing new or modified fishing methods, by providing loans for the purchase of powered fishing boats and nets, by demonstrating how equipment should be used and by encouraging greater production. It is believed that greater fish production could best be encouraged by increasing the cold storage facilities which are at present almost non-existent, and by developing an export trade in types of fish which are not yet being exported.

161. During the year three 22 foot Danish fishing boats which were on charter to local fishermen under hire purchase agreements were operated regularly and successfully. Despite their success the demand by others for such vessels

is hesitant. It is almost essential that the owner of a fishing boat should travel with it and those people who have money to invest in one are not attracted by the hard life which this entails. On the other hand the traditional fishermen cannot at present afford the original deposit of £150 necessary for a £1,150 boat (including gear), and possibly fear to become involved in an enterprise of a magnitude and complexity well beyond their customary level. To help them half-way, smaller diesel engines which can be installed in locally built sailing boats of about twenty feet length have been ordered. These engines will be installed and lent to fishermen free of charge for a period pending their decision to purchase them under the loans scheme.

162. The loans scheme has helped considerably in the introduction of nylon fishing nets and line, which are now firmly established in the industry, especially in Zanzibar. During the year, 70 fishermen in Zanzibar island obtained nets under the scheme, paying Shs. 350 down and the remaining Shs. 1,000 plus interest, over a period of ten months. Since October 1958, when nets first became available under the scheme, over one hundred fishermen have received loans and acquired nets, and in the course of the year funds amounting to £5,000 were revolving for this purpose. A number of fishermen who have already purchased one net under the scheme have shown their satisfaction by taking a loan for a second net.

163. Two Danish boats which had not been taken up by local fishermen were used by the Fisheries Officer for experimental fishing, particularly in connection with the use of a wire fish trap and long-lining. The fish trap, which was first tested in 1959, has proved to be capable of good catches of fish during the N.E. monsoon but during the S.W. monsoon these catches are not maintained. Unfortunately, being set in less frequented waters than the common basket work trap and of necessity being left, clearly buoyed, for several days, these wire traps are vulnerable to pilferage. A floating flag line was designed for use by the Danish vessels and tested on 37 nights between September and December. Drifting for about 10 hours each night, a total of 750 lb. of mixed fish and shark was caught giving an income of Shs. 10 per night, which was barely sufficient to cover the cost of bait. Very much better catches must be obtained, therefore, if the method is to be adopted. The main nylon line was about one mile long and carried 50 hooks at a depth of 10 fathoms. The assembly cost about Shs. 2,600.

164. A crawfish tangle net of a design similar to that used in Brittany was constructed, but as had been expected damage by sharks and from coral out-crops was serious and after a short time the net was rendered useless. It is clear that the main effort in the catching of crawfish must remain with the skin diver.

165. The export of frozen crawfish and crab by a private firm continued throughout the year and the firm's activities were extended to octopus and oysters. The catching side of this industry is in the hands of seaboard villagers, including women and children, who make a very appreciable income from this enterprising venture. The scientific staff of the East African Marine Fisheries Research Organisation is keeping a close check on the size of crawfish and the rate of catching at each fishing area to ensure that the fishing grounds are not over-exploited.

166. An attempt made to interest fishmongers in Zanzibar town in selling fish by weight met with such strong opposition from both fishmongers and a section of the buying public that it was not pursued. Retailing fish by weight apparently deprives both parties of the opportunity for practising their traditional skill in bargaining, a method they apparently much prefer.



A fisherman's traditional "ngalawa" comes into Mkoani port.



A 22-foot Danish fishing vessel leaves Zanzibar harbour.



A wire fish trap with its marker buoys.



The green mangrove crab, *Scylla serrata*, the flesh of which is exported from Zanzibar.

167. Over a period of 12 months in 1950 a census of fishermen, fishing craft and catches of fish was undertaken at all the main fishing centres. In November 1960 the fishermen and their craft were recounted in eleven of the most important fishing areas well distributed throughout Zanzibar island. Although seasonal migration of fishermen may occur it is believed that the totals recorded in the eleven areas common to the two censuses may justly be compared. In 1950 a total of 3,655 fishermen in these areas operated 846 boats of all kinds whereas in 1960 4,185 fishermen and 1,101 fishing boats were recorded. On the basis of these figures it is believed that at least 500 tons more fish per annum is caught now than was the case in 1950. This has all been consumed locally, and there is little doubt that the increased supplies have prevented an increase in the price to the consumer, in the face of demand from an increased population earning higher wages. The export of frozen fish to the mainland, which is the logical outlet for any further substantial increase in supplies, is considerably hindered by the mainland import duty of $22\frac{1}{2}$ per cent.

9. Extension Work

168. There has been an expanding interest amongst peasant farmers in the village group extension work that has been carried out in recent years. At the same time the majority of groups which have been under surveillance have now lost their original suspicions and doubts and are beginning to accept the Department, and in particular those officers with whom they are directly concerned, as a permanent factor in their life to which they can turn for assistance for a great variety of their needs, some of them scarcely of a truly agricultural nature. A response has been aroused which is leading to an enlightened interest in the expansion of their agricultural activities. This advance, however, is by no means automatic, and two of the original groups remain virtually unchanged in spite of the time devoted to them.

169. Four new groups were formed during the year making twelve in all. All four were formed at the request of the villagers themselves. Care is taken to ascertain that such requests are firmly based and not of an ephemeral nature, before new classes are formed. Two Young Farmers Clubs, one at Uroa and one at Kizimkazi have aroused the interest of the boys who have displayed considerable keenness and are proving an example to their elders. The Uroa club is planting chillies; they have made their own nursery and are hopeful of selling seedlings to the village cultivators. The Kizimkazi club, which has some 40 members, has planted yams, groundnuts and cassava as a group and their successful use of farmyard manure has stimulated its use by the villagers to such an extent that supplies are now inadequate to meet the demand.

170. At the beginning of the year a cyclostyled journal, with a coloured cover design, entitled *Mkulima* (Farmer) was produced. This is a monthly journal in Roman and Arabic script ki-Swahili. Produced specifically to meet a need that has arisen amongst the groups, it is becoming popular amongst a wider circle, especially in rural areas where there is an increasing demand for reading material of all kinds.

171. Regular weekly broadcasts in ki-Swahili were given on the Zanzibar radio service. Some of these consisted of interviews with local farmers which were not only of general interest but served to stimulate interest amongst those who took part.

172. No agricultural show was held during 1960 but farmers' days were organised in both Zanzibar and Pemba. Six such occasions were arranged at Kizimbani, one of which was for women cultivators and three for cocoa growers. Well attended visits were also organised at Matangatwani and Chambani in Pemba and at Makunduchi in Zanzibar. These latter have proved to be unexpectedly well supported.

173. No formal agricultural instruction was given in schools but district staff paid periodical visits to those schools which have school gardens. School children in Pemba made visits to the Department's farms and nurseries.

174. Apart from the more specialised activities already mentioned the general district staff endeavoured through personal day-to-day contact with farmers to influence them to improve their agriculture, particularly as regards diversification of cropping and the use of fertilizers for rice. As mentioned in Part II, Section 3, the value of fertilizers in rice growing was demonstrated on privately-owned plots in the principal rice areas.

10. Miscellaneous Activities

DISTRIBUTION OF PLANTING MATERIAL.

175. The production and distribution of planting material of a variety of crops was continued in Pemba and Zanzibar. The maintenance of nurseries for the production of clove, coffee, cocoa and coconut seedlings is in the hands of the district staff and constitutes a not inconsiderable part of their duties. During 1960 the number of clove seedlings raised was reduced but production of coffee seedlings was augmented and cocoa seedlings were produced in quantity for the first time. Chillie seedlings were also raised in both islands. Seedlings and budded citrus was produced at Kizimbani and in Pemba and these and a number of other fruit tree seedlings and worked plants were made available to the public.

176. The Copra Board financed the production of coconut seedlings but all other planting materials were produced with funds provided under the departmental estimates. Coconut and coffee seedlings were sold at 10 cents each, clove seedlings at 15 cents, nutmeg seedlings at 50 cents and all other seedlings at 30 cents except for cocoa and chillies which were issued free. Budded and worked plants were sold at Shs. 2 each and rice seed at Shs. 2 per pishi (about 4 lb.). Planting material of cassava and sweet potatoes was issued free from Kizimbani and from the Department's other farms in Zanzibar and Pemba. Edible seed was generally sold. A list of the planting material distributed during 1960 is given in Appendix II.

PROCESSING PLANTS.

177. Processing plants established under the development programme in 1948 again operated in both islands, at Makunduchi, Hanyegwa Mchana, Mdo (Kizimbani) and Kisongoni in Zanzibar and at Mtambile, Ole and, Matangatwani in Pemba. Development funds are used for the operation of these plants to which growers can bring their produce for processing at standard rates.

178. The following quantities of produce belonging to the public were dealt with during the year:—

	Zanzibar lb.	Pemba lb.	Total lb.	Total tons
Paddy	32,308	45,500	77,808	34.7
Sorghum	194	2,082	2,276	1.0
Maize	1,722	30	1,752	.8
Wheat	—	138	138	.1
Coffee	3,108	1,600	5,108	2.3
				38.9

DESTRUCTION OF VERMIN.

179. The Provincial Administration employs a small number of hunters for the destruction of monkeys in both islands where these constitute a serious menace to crops. In response to insistent pleas from cultivators in the coral areas of Zanzibar the Department undertook the poisoning of wild pig. Poison baits are laid down in the evening and visited the following day. Of 4,948 baits laid down during the year, 3,000 were taken and 812 dead pigs were subsequently found. This service is much appreciated by the cultivators in the areas where pig are abundant for the animals can be very destructive.

180. In Zanzibar town the Department's laboratory continued to prepare baits containing the avicide Corbaureve for the destruction of the Indian house crow, *Corvus splendens splendens*, which is a considerable nuisance in the town and is destructive to other birds and to crops.

POULTRY.

181. Small flocks of poultry are maintained by the Department at Weni in Pemba and at Kizimbani and Makunduchi in Zanzibar. The majority of the birds are Rhode Island Red, but white Leghorn, Brown Leghorn and Light Sussex were also kept. The flocks provide setting eggs and young stock for sale to poultry keepers and are used to demonstrate poultry keeping methods. A small number of local hens were kept at Weni, in order to compare their performance, and subsequently that of their half-bred progeny, with the performance of the imported breeds. Average egg production at Weni during the year was Light Sussex 177, White Leghorn 118, Rhode Island Red 115 and local 88. In Pemba, 3,755 eggs were sold for setting and 24 cockerels for breeding.

11. Government Plantations

182. The Kigomeni plantation of 108 acres of coconuts, which is a part of the Mtoni group of plantations, was exchanged by Government for land situated in the centre of Zanzibar town. There were no other changes in area but some 140 coconut palms were removed where their presence was inimical to electricity lines, roads and buildings other than those of the Department of Agriculture.

183. The year was marked by a very small clove crop, falling prices for copra and a considerable expansion in the development of the plantations through the planting of cocoa at Kidichi and Selem. Apart from the raising of seedlings and actual planting, this involved some heavy work in the preparation of land, particularly in the removal of trees. Planting of clove and coconut seedlings continued on a small scale. Cassava was grown as usual and sold to Kizimbani. The lime plantations gave a much better crop than during the past two years, partly as a result of experimental spraying against withertip disease. Cattle were introduced for observation of controlled grazing on a small scale. A fertilizer trial on coconuts was laid down. Two hundred acres of coconuts continued to be used for research on *Pseudotheraptus wayi* control (described in Part II, sections 2 and 3).

184. The financial estimates for the year, based on low clove and copra prices, the expectation that a larger clove crop would follow the preceding two very small ones, and an expansion in cocoa planting, had provided for expenditure of £26,486 and revenue of £20,392 giving a deficit of £6,094. In the outcome, revenue reached £17,448 only. This was mainly due to the fact that a third small clove crop realised some £2,334 less than anticipated, while a continuing

fall in copra prices and the loss of Kigomeni plantation reduced the revenue from the coconut plantations. On the other hand, although cocoa work was expanded beyond the original proposals, resulting in an expenditure some £1,100 greater than originally estimated, overall expenditure was kept down by curtailing cultivation of cloves and coconuts and totalled £24,584. Thus the deficit on the year's working amounted to £7,136.

185. The accounts for the year are shown in Appendix I. The overall pattern, with the Mtoni plantation making a profit and the others a loss, is much the same as that shown in 1959 and is what is to be expected when there is a poor clove crop. The plantations of Kidichi, Selem and Jendele depend on cloves for a large part of their revenue. Total revenue was down by 19 per cent. in comparison with 1959. This was mainly due to a 21 per cent. reduction in revenue from copra, which realised £13,410 only compared with £17,078 in 1959. Increased overseas sales of whole coconuts relieved the situation somewhat and provided £847 more revenue than in 1959. Overall expenditure was some £1,760 or 7.8 per cent. greater than in the previous year. The increased expenditure was incurred largely on labour. It is estimated that of the total expenditure, excluding salaries, of £19,676 about 15.5 per cent. or £3,045 was in respect of development, and represents capital expenditure for land clearing and the planting and maintenance of young clove, coconut, coffee and cocoa trees which have not yet come into bearing. The true value of many of the plantations to Government is much greater than is indicated by a direct comparison of expenditure and revenue figures.

186. Certain details of the clove crop are given in the following table. The 1959/60 crop consisted mostly of "vuli" season cloves which were harvested in January and February of 1960. The 1960/61 crop on the other hand was all picked before the end of November.

Season		Green cloves lb.	Dry cloves lb.	Dry stems lb.	Average clove prices per cental Shs.
1960-61	.. ..	6,030	1,959	582	84.28
1959-60	.. ..	86,350	25,926	6,388	71.48
1958-59	.. ..	20,176	6,224	1,595	112.36
1957-58	.. ..	319,118	99,248	23,046	198.02

187. The coconut crop totalled 2,254,315 nuts and was some 2,400 nuts more than in 1959, and approximately 6 per cent. less than the preceding five year average. Coconuts were disposed of during the year as follows:—

Made into copra	.. ..	1,969,212
Sold in the husk	.. ..	272,307
Exported	.. ..	49,150
Used for seed	.. ..	1,000
Found rotten	.. ..	19,896
Lost by fire	.. ..	7,291

Of the nuts sold in the husk, 191,000 were purchased by the Copra Board for planting. The remainder were sold to employees and to the hospital. The average price obtained was Shs. 145 per 1,000. The husked nuts which were exported realised an average price of Shs. 324 per 1,000. The following table gives the production of copra in 1960 and previous years:

Year		Nuts made into copra	Copra made tons	Nuts per ton of copra	Average price of copra per cental Shs.
1960	.. ..	1,969,212	264	7,467	47.12
1959	.. ..	2,019,604	265	7,612	60.70
1958	.. ..	2,175,262	302	7,194	51.13
1957	.. ..	2,232,031	304	7,344	44.35

188. The cocoa crop of the Government Plantations for the season 1959/60 (April to March) amounted to 1,133 lb. and realised Shs. 2,073. Picking during 1960 for the 1960/61 crop was at the same level, the harvest for the calendar year amounting to 25,505 pods compared with 25,632 in 1959. The plantations' fermentary at Selem continued to be used for the preparation, without charge, of cocoa belonging to private growers.

189. The lime harvest from $8\frac{1}{2}$ acres of budded limes and two acres of seedling limes planted in 1952 and 1953 respectively reached 21.8 tons, which was a great improvement upon the 7.1 tons of 1959 and the $9\frac{3}{4}$ tons of 1958 but still did not equal the crop of 1956, the second year of bearing, when $23\frac{1}{2}$ tons were obtained. A part of the area has been used during the past three years for experiments in the control of withertip disease (described in Part II section 3) and the spraying that was undertaken towards the end of 1959 was in great measure responsible for the enhanced crop in 1960. The crop was spread over the whole year, with one peak only, in April and May. Most of the limes were sold to the Clove Growers' Association at 20 cents per lb. and the crop realised £465. Expenditure amounted to £167, giving a nett profit per acre of Shs. 566. Thus, out of the five years of harvest since 1956, four years have shown a profit, and one a loss and the average annual return over the five years amounted to Shs. 269 per acre profit.

190. Mandarins at the Dole pilot plots suffered from a dieback and some were uprooted. The orange and grapefruit trees maintained fair condition, however, and the harvests amounted to 13,627 oranges, 3,186 grapefruit and 2,410 mandarins, equivalent to 25,31 and 23 fruits per tree respectively.

191. Development planting of cloves and coconuts consisted largely of in-filling, mostly in young plantations. In all, 2,576 clove seedlings and 723 coconut seedlings were planted.

192. Cocoa planting was expanded, over 9,000 seedlings being planted. Of these, nearly 8,000 were used for new plantings including the filling in of an area planted at 12 feet by 12 feet in 1959 to reduce the spacing to $8\frac{1}{2}$ feet, and the interplanting of *forastero* seedlings between old *criollo* trees which they will eventually replace. The remaining 1,000 seedlings replaced losses. By the end of the year's planting there were approximately $21\frac{1}{2}$ acres carrying young *forastero* cocoa on the Government plantations. The new plantings were sprayed with D.D.T. at least twice during the year to control leaf-eating insects and the older trees planted in 1955 and 56 were sprayed once or more with dieldrin to control mealy bug. Rats have proved to be troublesome on the low growing young trees which have been grown from cuttings.

193. The majority of the *criollo* trees which were planted in 1952 under natural forest had by 1960 failed to make good growth except in the more open areas and in consequence, most of the remaining forest trees were removed. Although some of the cocoa trees showed adverse effects from the change, the majority made much improved growth.

194. Vegetative propagation was continued using both the solar propagator and polythene sheeting. In all, 900 stem cuttings were planted in the propagator and 690 in baskets under sheeting. The former gave 82 per cent. rooted cuttings and the latter between 50 and 60 per cent. The propagation of cuttings from tree No. 2 at Kinuni Moshi, the highest yielder of those planted in about 1898, was begun.

195. During the second half of the year 25 acres of land was prepared for planting in 1961. Most of this carried *Cassia siamea* trees which had been planted as shade for *criollo* cocoa some ten years ago, and all had to be removed. Bananas for shade and protection were planted during the late rains and lines were dug for the planting of windbreaks around and across the area, in both directions, to divide the fields into blocks of about two acres each. In preparation for the 1961 planting some 26,000 seeds were planted before the end of the year. They were sown direct into polythene bags.

196. Government Plantations continued to produce compost for sale to the public and for use on the plantations, particularly when planting cocoa. The presence of foot and mouth disease at Mtoni dairies, where the compost is prepared, stopped production for three months, with the result that less was made than in former years. Of the 331 tons produced, 279 tons were sold at Shs. 7.50 per ton realising £105. The average cost of production was Shs. 11.43 per ton, and after crediting the value of the compost used on the plantations, there was a net loss of £76 for the year.

12. Chemical Laboratory

197. The chemical section of the Department continued to be responsible for undertaking a large variety of chemical analyses and reports, both for Government and private concerns. The number of samples dealt with during the year increased considerably totalling 2,865 compared with 1,883 in 1959. This increase was mainly due to a rise in exports of coconut oil, samples of which must be examined under the relevant export regulations. Of the samples examined, 2,179 were agricultural commodities, 416 samples were received from the Health Department of which 315 were of milk taken from milk vendors in Zanzibar town, while 156 were forensic exhibits submitted by the Police. Indian Hemp figured prominently amongst these.

198. The programme of analysis of Pemba soils was left in abeyance during 1960. The general survey of the trace element status of the soils of the Protectorate was also adjourned, but a number of soils in which cocoa was growing were given special attention. Using the Webb subtractive technique with small pots to determine the availability of nitrogen, phosphorus, potassium, magnesium, calcium and sulphur, tests of soils from two centres in Zanzibar and two in Pemba were carried out using cocoa or tomatoes as indicator plants. Soil from Kinaoni (*kinongo* type) was severely deficient in nitrogen, deficient in potassium and possibly deficient in sulphur. *Utasi* soil from Matangatwani showed deficiency in nitrogen and possibly sulphur, but somewhat surprisingly appeared to contain adequate amounts of phosphorus. *Mtifutifu* soil from Chimbabule in Pemba showed deficiency of all the major nutrients except calcium and perhaps potassium. Phosphorus was particularly deficient. *Mchanga* soil from the cocoa plot at Mbuzini in Zanzibar showed no deficiencies, but this result may be due to the fact that the nutrients were applied at a single watering instead of daily. In general these tests, except for the last mentioned, are in conformity with soil analyses made in 1959.

199. Young cocoa plants from the Chimbabule plot—and from other plots in both islands—showed malformation of the leaves, some of which were sickle-shaped or narrow and elongated, even strap shaped and sometimes spiralled

around the main vein. In some instances the intervenal areas were crinkled and chlorotic. A pot test using sorghum as the indicator plant and incorporating zinc, copper, manganese, molybdenum, and boron indicated that zinc alone and the other elements in combination without zinc were effective in improving growth. One and a half year old trees showing similar symptoms at Langoni and Kinaoni in Zanzibar responded to spray applications of 0.59 per cent. and 1.0 per cent. zinc sulphate respectively, by producing normal healthy leaves at the next flush.

200. At Kizimbani and some other nurseries numbers of cocoa seedlings which were being raised in pots in prepared potting mixtures developed chlorotic symptoms in which the leaves, in extreme cases, had no green colour at all. Following application of a 1 per cent. solution of ferrous sulphate the normal green colour was resumed.

201. Foliage sprays of urea, potassium sulphate and magnesium sulphate have not produced any improvement in the condition of the foliage of mature cocoa trees growing under fairly deep shade, which was showing severe necrosis of the tips of the leaves.

202. Further investigation of chlorotic mottling of citrus leaves, using sprays incorporating zinc, boron, manganese, iron, molybdenum and copper, failed to give positive results and the cause is still undetermined. Analysis of yellow and green lime leaves from a *mchanga* soil at Kombeni showed the yellow leaves to contain more potash but less nitrogen, phosphorus, magnesium and calcium than the green leaves. This result confirms the normal practice of recommending the use of superphosphate and sulphate of ammonia on these soils.

203. Further attempts were made to assess the potash status of soils by chemical analysis, but again without success. Using citric acid and the flame photometer no differences were observable between 30 *kinongo*, 25 *mchanga* and 5 *namo* soils; this result is contrary to field experiments.

204. Three microplot trials to test the value of coir dust ash as a potash fertilizer were carried out in October and November on *uwanda* and shallow *kinongo* soils. Using maize as the indicator crop, harvested green after 40 days, a small response to ash and a larger one to potassium chloride were obtained at one centre only. The interaction of the two potash fertilizers approached a negative response however. In a laboratory trial in tins, using the same microplot layout with tomato plants grown in deep *kinongo* soil from Kinaoni there was a highly significant response to the ash but none to muriate of potash. It would now seem to be worthwhile undertaking field trials on a larger scale, taking the crops to maturity.

205. In the annual report for 1959 reference was made to investigations that had been carried out in regard to apparently excessive amounts of manganese in leaves of cocoa, clove and eucalyptus trees, and it was noted that liming reduced manganese uptake in clove trees. During 1960 it was found that the addition of both lime and superphosphate reduced the uptake of manganese in cowpeas grown in *mchanga* soil in pots.

206. Pastures at Kizimbani were analysed for copper content when it was found that cattle suffering from an uncommon diarrhoea were cured by the administration of copper sulphate. The herbage was found to contain less than five parts per million of copper and there was no appreciable difference between the planted pastures and the natural grazing in different parts of the farm. The condition occurred during the main rains.

13. Produce Inspection

207. The Produce Inspection section of the Department operates in Zanzibar town and Wete, Chake Chake and Mkoani in Pemba. The year 1960 was the thirty-fifth year of cloves inspection and the twenty-fifth year of copra inspection. The main concern of the section in Pemba is the examination under the Adulteration of Produce Decree of cloves, clove stems and copra prior to shipment to Zanzibar and of cloves and clove stems offered for sale to the Clove Growers Association. Coconut oil exported direct from Pemba is also examined under the Agricultural Produce Export Decree. In Zanzibar town the section examines all cloves, clove stems and copra which reach the local markets and these commodities cannot be sold in the markets unless they reach the standards specified under the Adulteration of Produce Decree. The chief concern of the Zanzibar section is to ensure that all cloves, clove oil, chillies, copra and coconut oil exported conform to the standards laid down by the Agricultural Produce Export Decree. The oil samples are examined by the Department's chemical section. The new export grades for cloves, which were reported upon in the Annual Report for 1959, came into force on 1st January, 1960. The new system has three grades, namely Special Quality, Standard Quality and Distillation Quality, in place of the previous four grades.

208. The quantities of produce examined under the Adulteration of Produce Decree during the year are shown in the following table.

Produce and Origin				Deliveries bags	Passed bags	Failed bags		Percentage of failures	
						Excessive moisture	Extraneous matter		
At Pemba:									
Cloves	..	..	..	172,104	158,632	10,159	3,313	7.8	
Clove stems	..	..	..	143,725	142,331	721	673	1.0	
Copra	..	..	..	57,045	54,259	1,345	1,441	4.9	
TOTAL PRODUCE				..	<u>372,874</u>	<u>355,222</u>	<u>12,225</u>	<u>5,427</u>	<u>4.7</u>
At Zanzibar:									
Zanzibar cloves	..	..	..	28,723	27,434	456	833	4.5	
Pemba cloves	..	..	..	181,589	172,202	8,967	420	5.2	
Zanzibar clove stems	..	..	..	14,976	14,935	4	37	0.3	
Pemba clove stems	..	..	..	18,705	18,705	—	—	—	
Zanzibar copra	..	..	..	124,005	118,791	4,222	992	4.2	
Pemba copra	..	..	..	49,561	48,930	—	631	1.3	
TOTAL PRODUCE				..	<u>417,559</u>	<u>400,997</u>	<u>13,649</u>	<u>2,913</u>	<u>4.0</u>
Protectorate total produce				..	790,433	756,219	25,874	8,340	4.3

209. Cloves and copra examined in Pemba are re-examined in Zanzibar and therefore reappear in the second part of the table. The Pemba clove stems examined in Zanzibar are those sent by merchants from Pemba to Zanzibar; those bought by the C.G.A. in Pemba are not re-examined in Zanzibar. The total number of bags examined compares with 916,612 examined in 1959. The total percentage of failures, at 4.3, was a little less than half that for the previous year. This was mainly due to an improvement in the quality of the

cloves consequent upon the dry weather experienced. Thus failures in Pemba dropped from 11.4 per cent. in 1959 to 7.8 while Pemba cloves examined in Zanzibar showed 5.2 per cent. failures in place of 11.6 per cent. in 1959. The copra failures in the Zanzibar market also fell slightly.

210. A new copra market was opened at Saateni in the industrial area of Zanzibar town in February. This has released a godown near the port area for use as a Zanzibar Clove market and has enabled the Pemba Clove market to be extended to occupy the space formerly occupied by both markets.

211. Produce examined in Zanzibar prior to export included 199,443 bales or bags of cloves (12,327 tons), 4,506 tons of copra, 13,041 drums and 1,754 tins of coconut oil (2,487 tons) and 1,721 bags of chillies (61 tons). In addition, 1,000 drums (173 tons) of coconut oil were examined in Pemba prior to direct export from there.

212. At the request of exporters, whole coconuts for export were examined for the presence of pests or diseases and phytosanitary certificates were provided for 1,137,450 nuts during the year. This inspection is requested particularly for nuts exported to the Middle East, Italy and Continental Europe. The phytosanitary inspection of produce passing through the Zanzibar port and its disinfection where necessary were under the general control of the Inspector of Produce. This work is described in the following section.

14. Phytosanitary Control

213. The regulations governing the inspection and fumigation of goods likely to harbour *Trogoderma granarium* continued in force. Principally directed towards preventing the entry of the insect in imported goods, they are also operated to safeguard the mainland territories against contamination from infested Zanzibar goods. All vessels carrying cargo for Zanzibar are inspected and infested cargo is fumigated in lighters by a commercial company based in Dar es Salaam, using methyl bromide. The number of vessels which were found to contain *Trogoderma* increased in 1960 despite the fact that fewer came to Zanzibar than in the previous year. The experience of the last three years, both as regards numbers of infested vessels and sources of infestation suggest that, at least in its impact on Zanzibar, the pest is increasing. Some details for 1960 and previous years are given in the following table:—

				1960	1959	1958
Number of vessels examined	..	..	..	87	97	198
Number of vessels infested	..	..	..	31	26	18
Percentage number infested	..	..	..	36	27	9
Number infested packages fumigated	..	..	..	52,236	65,789	57,320
Number of fumigation jobs	..	..	..	19	21	14

214. The commonest source of infestation was rice from Burma, but rice from Singapore and Pakistan has increasingly been found to be infested. Rice from both the latter countries was invariably clean prior to the middle of 1959 and rice from Thailand remained free from *Trogoderma* throughout 1960, except on one occasion when cross-infestation en route probably occurred. Spices from India were very frequently infested and cargoes of wet dates from Muscat, which are usually wrapped in hessian from used gunny bags, increasingly carried the insect in large number within the wrappings. All imports from Australia, Vietnam, Formosa, South Africa, Nyasaland and Portuguese East Africa remained free from *Trogoderma*.

215. Fumigation of goods prior to export was mainly concerned with second-hand gunny bags, but there was also an unusually large amount of wheat flour which was re-exported to the United Kingdom for cattle food after having become unsaleable in Zanzibar. Fumigation of export goods was undertaken under sheets in godowns and in all, 15 jobs of this kind were undertaken involving 17,062 packages as compared with 11,254 in 1959.

216. Storage godowns within Zanzibar town were inspected from time to time and *Trogoderma* was detected on two occasions. In each case the produce was carefully removed for fumigation and the godowns were then sprayed with malathion. Of the 75 godowns inspected during the year, 17 were sprayed with malathion and the contents of ten was treated with 0.5 per cent. BHC. Both this strength of BHC and the 0.04 per cent. preparation were on sale to the public and nearly 800 lb. was purchased.

217. On 30th July new phytosanitary regulations were promulgated under the Plant Protection Decree prohibiting the importation of all plants or plant parts unless specially exempted or covered by a Permit. In its main provisions the new legislation brought Zanzibar into line with the mainland territories and the other countries participating in the Inter-African Phytosanitary Commission. In operating the regulations reference is made to a card index provided by the Standing Technical Committee on Plant Import and Export for East Africa which details the requirement applicable to any particular type of plant or part of a plant. Current regulations prohibiting the importation of banana plants, citrus and sweet potatoes from the mainland of East Africa were incorporated in the new regulations. These three species are prohibited owing to the presence on the mainland of Panama disease of bananas, bud mite of citrus and a sweet potato virus, none of which have been observed in Zanzibar or Pemba.

218. To relieve importers of the necessity of obtaining permits in cases where they would always be given without restriction, the legislation provides that the Director of Agriculture may grant open permission to import certain plants from certain countries by an order published in the *Gazette*. Such an Order has been published and it includes plants or crops from East Africa, with some dozen exceptions, and most commercial imports intended for processing and consumption. Certain common articles of trade, however, are not included within this exemption; examples are onions, paddy rice, unroasted coffee and fresh fruits.

219. In order to give importers time to make arrangements to obtain the necessary permits or alternative supplies, the regulations were made operative as from 1st October. With the co-operation of the importers they have operated smoothly and with little disruption of trade.

15. Principal Agricultural Legislation

220. The following is a list of the more important agricultural legislation promulgated during the year:—

Decree No. 1	A Decree to Amend the Adulteration of Produce Decree, reduces the maximum permissible moisture content of cloves offered for sale from 16 per cent. to 14 per cent.	7.5.60
Decree No. 20	A Decree to Amend the Clove Growers Association Decree, permits the Association to continue processing lime fruit without payment of a fee for an unspecified period instead of for a fixed period, as formerly.	31.12.60

Decree No. 24	A Decree further to Amend the Customs Tariff Decree, waives the duty of 20 per cent. previously payable on the importation of unprocessed cashew nuts.	14.11.60
Legal Notice No. 8.	The Clove Grading and Export (Amendment) Rules, 1960, permit the export of cloves in standard packs of 28-lb., 56-lb. and in unspecified retail packs in addition to those previously permitted.	19.1.60
Legal Notice No. 15.	The Customs Management Decree Notice, permits the export of coir fibre direct from Pemba.	11.2.60
Legal Notice No. 17.	The Seaweed (Royalties) (Amendment) Order, 1960, reduces the royalty on exported seaweed from Shs. 100 to Shs. 50 per ton.	29.2.60
Legal Notice No. 18.	The Animal Diseases (Importation of Animals) Regulations, 1960, re-allow the importation of cattle from Kenya provided a permit is obtained from the Director of Agriculture.	2.3.60
Legal Notice No. 26.	The Customs Management Decree, Notice, permits the export of cassava from Pemba.	19.4.60
Legal Notice No. 27.	The Land Acquisition Decree, Declaration of Intended Acquisition, declares the intention to acquire "Tunguu uwanda".	22.4.60
Legal Notice No. 38.	The Agricultural Fires Decree, 1958 (Application) (Amendment) Order, 1960, applies the provisions of the Agricultural Fires Decree to the Magharib and Central Mudirias in Zanzibar and the Wete Mudiria in Pemba, as from 1.9.60.	21.6.60
Legal Notice No. 50.	The Plant Protection Order, 1960, provides for phytosanitary control of the importation of plants and plant parts, with effect from 1.10.60.	28.6.60
Legal Notice No. 51.	The Plant Protection (Exemptions) Order, 1960, provides for certain specified plants or plant parts to be imported without permit or examination.	28.6.60
Legal Notice No. 63.	The Jozani Forest Reserve (Constitution) Order, 1960, constitutes a Government Forest Reserve at Jozani.	19.9.60
Legal Notice No. 70.	The Animal Diseases (Amendment) Regulations, 1960, provide for the payment of a fee for permits for the importation of animals, and revise the fees payable for health certificates and veterinary attention.	25.10.60

Statement of Revenue and Expenditure of the Government Plantations

REVENUE TO THE NEAREST £

	<i>Kidichi</i>	<i>Selem</i>	<i>Mtoni</i>	<i>Chukwani</i>	<i>Jendele</i>	<i>Total</i>
	£	£	£	£	£	£
Cloves and stems	551	382	12	—	2	947
Copra	7,151	1,443	3,131	1,685	—	13,410
Coconuts	1,834	284	388	183	—	2,689
Coconut crops	22	12	267	127	85	513
Miscellaneous	660	116	206	28	5	1,015
Leased plantations	—	57	—	—	—	57
Rent of quarters	23	6	6	4	—	39
TOTAL ..	10,241	2,300	4,010	2,027	92	18,670
Deduct value of produce brought forward from 1959	873	141	343	315	—	1,672
BALANCE ..	9,368	2,159	3,667	1,712	92	16,998
Add value of produce carried forward to 1961	65	—	300	85	—	450
TOTAL 1960 REVENUE ..	9,433	2,159	3,967	1,797	92	17,448

EXPENDITURE TO THE NEAREST £

	<i>Kidichi</i>	<i>Selem</i>	<i>Mtoni</i>	<i>Chukwani</i>	<i>Jendele</i>	<i>Total</i>
	£	£	£	£	£	£
<i>Personal Emoluments:</i>						
Headquarters staff	1,058	235	450	195	19	1,957
Field staff	1,779	483	315	374	—	2,951
TOTAL PERSONAL EMOLUMENTS ..	2,837	718	765	569	19	4,908
<i>Other Charges:</i>						
Transport and travelling	148	72	33	36	11	300
Materials and tools	72	23	11	16	1	123
Labour	9,590	2,311	2,492	2,157	768	17,318
Repairs to buildings	502	121	89	118	3	833
Fuel and maintenance of vehicles ..	396	198	99	99	—	792
Hire of tractors	13	85	—	—	—	98
Cocoa development	538	56	—	—	—	594
TOTAL ..	11,259	2,866	2,724	2,426	783	20,058
Deduct expenditure on afforestation ..	—	—	—	—	382	382
TOTAL OTHER CHARGES ..	11,259	2,866	2,724	2,426	401	19,676
PERSONAL EMOLUMENTS ..	2,837	718	765	569	19	4,908
TOTAL EXPENDITURE ..	14,096	3,584	3,489	2,995	420	24,584
Profit	—	—	478	—	—	478
Loss	4,663	1,425	—	1,198	328	7,614

Net loss .. £7,136.

Appendix II

Distribution of Planting Material

Areca nut, seedlings	..	..	..	..	nos.	2
Avocado pear, grafted	..	..	..	..	..	13
Cassava, cuttings	..	..	..	..	..	80,300
Chillie, seedlings	..	..	..	..	..	432,008
Clove, seedlings	..	..	..	..	..	123,365
Cocoa, seedlings	..	..	..	..	..	100,553
Coconut, seedlings	..	..	..	..	..	133,720
Coffee, seedlings	..	..	..	..	..	68,728
Cowpeas, seed	..	..	..	..	lb.	79
Derris, rooted cuttings	..	..	..	..	nos.	10,870
Durian, seedlings	..	..	..	..	..	63
<i>Eugenia aqua</i> seedlings	..	..	..	..	..	46
<i>Eugenia aqua</i> , marcotts	..	..	..	..	..	46
<i>Eugenia javanica</i> , marcotts	..	..	..	..	..	65
Grape fruit, budded	..	..	..	..	..	192
Groundnut, unshelled nuts	..	..	..	..	lb.	500
Guava, seedlings	..	..	..	..	nos.	22
Indian Plum, seedlings	..	..	..	..	..	57
Jak fruit, seedlings	..	..	..	..	..	28
Kapok, seedlings	..	..	..	..	..	288
Lemon, smooth, budded	..	..	..	..	..	8
Lime, budded	..	..	..	..	..	5,520
Lime, seedlings	..	..	..	..	..	4,745
Lime, sweet, budded	..	..	..	..	..	13
Lime, sweet, seedlings	..	..	..	..	..	20
Litchi, marcotts	..	..	..	..	..	112
Maize, seed	..	..	..	..	lb.	874
Mandarin, budded	..	..	..	..	nos.	131
Mango, grafted	..	..	..	..	..	232
Nutmeg, seedlings	..	..	..	..	..	1,300
Orange, budded	..	..	..	..	..	823
Pepper, rooted cuttings	..	..	..	..	..	556
Pineapple, suckers	..	..	..	..	..	24,734
Pomegranate, seedlings	..	..	..	..	..	60
Pomelo, budded	..	..	..	..	..	60
Pomelo, seedlings	..	..	..	..	..	23
Rambutan, marcotts	..	..	..	..	..	8
Rambutan, seedlings	..	..	..	..	..	377
Rice, seed	..	..	..	..	lb.	3,675
Sapodilla, marcotts	..	..	..	..	nos.	51
Sapodilla, seedlings	..	..	..	..	..	49
Soursop, seedlings	..	..	..	..	..	19
Star apple, seedlings	..	..	..	..	..	17
Yam, tubers	..	..	..	..	lb.	13,000

NOTE: Fair quantities of sweet potato vines were also issued.

Domestic Exports, 1960

<i>Items</i>	<i>Unit of quantity</i>	<i>Quantity</i>	<i>Value £</i>	<i>Percentage of total value</i>
Cloves	cental of 100 lb.	276,559 ..	3,535,221 ..	74.13
Clove bud and stem oil	lb. ..	339,902 ..	120,993 ..	2.54
Copra	ton ..	4,508 ..	310,391 ..	6.51
Coconuts	cwt. ..	97,133 ..	136,459 ..	2.86
Coconut oil	" ..	53,430 ..	274,484 ..	5.76
Oil cake	" ..	50,259 ..	57,831 ..	1.21
Soap, Common and toilet	" ..	25 ..	78 ..	—
Coir fibre, unmanufactured	ton ..	5,909 ..	200,769 ..	4.21
Coir fibre, manufactured	" ..	43 ..	2,642 ..	0.06
Chillies	cwt. ..	1,209 ..	17,843 ..	0.38
Kapok	" ..	5 ..	11 ..	—
Tobacco, unmanufactured	lb. ..	22,247 ..	1,000 ..	0.02
Fruit, fresh	cwt. ..	2,679 ..	2,885 ..	0.06
Lime juice	Imp. gallon ..	45 ..	14 ..	—
Lime oil	cwt. ..	5 ..	1,113 ..	0.02
Ox hides	" ..	1,156 ..	8,177 ..	0.17
Skins, sheep and goats	" ..	241 ..	1,602 ..	0.03
Livestock	no. ..	3 ..	15 ..	—
Forest products ..	value ..	— ..	17,165 ..	0.36
Shells, marine	cwt. ..	8,867 ..	33,819 ..	0.71
Fish, dried or salted ..	" ..	254 ..	2,383 ..	0.05
Fish, fresh	" ..	58 ..	1,364 ..	0.03
Beche-de-mer	" ..	811 ..	6,290 ..	0.13
Seaweed	ton ..	79 ..	4,205 ..	0.09
Lime	cwt. ..	41,830 ..	13,473 ..	0.28
Other unclassified natural products	— ..	— ..	18,552 ..	0.39
		TOTAL ..	<u>4,768,779</u> ..	<u>100.00</u>

Approximate Production of Cloves in Frasila of 35 lb. for Thirty-five Crop Years

(1st July to 30th June)

(Based on receipts of cloves at the Central Market and C.G.A.)

Season	Zanzibar Frasila	Pemba Frasila	Total Frasila	Mean crop per season in 5-year periods Frasila
1925/26	219,192	392,622	611,814	—
1926/27	203,843	529,186	733,029	—
1927/28	190,370	500,382	690,752	—
1928/29	74,828	125,740	200,568	—
1929/30	318,647	610,296	928,943	633,021
1930/31	51,796	201,320	253,116	561,281
1931/32	175,070	760,786	935,856	601,847
1932/33	242,772	244,594	487,366	561,170
1933/34	146,098	781,090	927,188	706,494
1934/35	360,037	503,415	863,452	693,395
1935/36	65,938	232,571	298,509	702,474
1936/37	45,096	351,568	396,664	592,636
1937/38	446,500	909,416	1,355,916	768,346
1938/39	39,879	115,211	155,090	613,926
1939/40	168,041	501,474	669,515	575,139
1940/41	146,323	575,277	721,600	659,757
1941/42	297,578	889,550	1,187,128	817,850
1942/43	40,049	223,691	263,740	599,414
1943/44	263,423	777,218	1,040,641	776,525
1944/45	200,417	459,396	659,813	774,584
1945/46	26,493	161,075	187,568	667,778
1946/47	170,280	924,329	1,094,609	649,074
1947/48	30,914	280,986	311,900	658,906
1948/49	81,700	310,971	392,671	549,312
1949/50	153,888	430,253	584,141	514,178
1950/51	158,588	1,081,786	1,240,374	724,739
1951/52	45,892	290,007	335,899	572,977
1952/53	91,417	82,328	173,745	545,366
1953/54	179,883	1,101,302	1,281,185	723,069
1954/55	97,944	448,927	546,871	715,615
1955/56	139,132	746,093	885,225	644,585
1956/57	117,068	330,437	447,541	666,913
1957/58	220,803	1,327,664	1,548,467	941,858
1958/59	75,288	375,659	450,947	775,810
1959/60	148,427	1,009,767	1,158,194	878,075
Average for 35 Seasons	155,255	531,040	672,480	—

Monthly and Annual Rainfall Totals for the Year 1960, for Stations in Zanzibar and Pemba

Pemba		Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total 1960	Total 1959
Kigomasha	..	0.88 2	0.25 1	2.94 8	16.99 22	10.15 19	9.76 20	2.75 17	0.85 9	2.02 13	5.72 12	2.75 13	0.64 6	55.70 142	57.63 129
Matangatwani	..	1.84 3	0.32 1	10.25 11	22.69 23	10.60 15	7.38 16	2.29 12	0.32 4	0.96 5	2.49 5	1.38 4	1.16 3	61.68 102	57.45 106
Wete	..	2.23 4	0.11 1	5.48 15	20.95 20	11.10 18	6.31 13	2.37 11	0.26 2	1.15 6	3.55 6	1.20 3	2.42 7	57.13 106	60.79 126
Limbani	..	3.91 6	0.02 1	8.63 19	20.43 25	11.34 23	8.66 20	3.31 17	0.42 7	0.68 11	3.78 8	1.35 8	2.99 9	65.52 154	68.20 98
Ole	..	1.19 8	0.49 2	7.77 17	24.86 26	13.37 20	6.80 17	3.70 9	0.69 5	0.95 10	6.01 9	0.16 2	0.31 1	66.30 126	55.23 97
Chake Chake	..	1.81 7	0.45 1	11.21 19	27.25 25	11.30 18	5.49 15	2.52 11	0.54 5	0.47 6	3.05 6	0.09 2	2.33 4	66.51 119	63.34 115
Wesha	..	2.86 5	0.44 2	8.24 16	27.28 27	10.97 21	7.38 22	2.15 17	0.29 6	0.73 10	3.06 9	0.33 5	2.00 9	65.73 149	66.15 127
Chambani	..	3.56 6	0.75 3	10.73 19	32.34 26	9.14 17	7.19 14	2.52 5	0.14 1	0.67 5	2.70 6	0.30 3	1.96 9	72.00 114	56.90 95
Mtambile	..	2.35 10	0.72 6	11.41 21	23.79 26	13.63 19	7.27 4	1.59 8	0.62 5	1.18 7	2.66 8	2.64 5	4.99 16	72.85 145	72.68 116
Mkoani	..	0.32 5	0.11 1	10.37 13	24.11 23	10.52 16	9.20 17	0.97 8	0.56 6	0.24 3	1.98 8	1.80 4	1.88 7	62.06 111	62.93 110

Agricultural Report

Zanzibar	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total 1960	Total 1959
Mkokotoni ..	4.22 9	1.21 6	10.99 18	15.12 19	5.73 7	4.05 8	2.57 10	3.01 11	5.11 19	0.88 6	2.71 11	0.64 3	56.24 127	64.10 111
Mkwajuni ..	3.31 9	1.74 5	9.62 16	15.47 20	7.94 18	4.48 15	2.29 8	2.32 11	2.86 11	1.54 8	1.55 8	0.78 7	53.90 136	58.22 143
Kisongoni ..	2.55 5	1.70 1	7.51 12	12.97 18	6.34 10	4.44 10	1.04 5	0.73 4	1.69 6	2.62 6	1.41 3	1.07 2	44.07 82	57.13 97
Selem ..	2.81 11	1.27 4	9.10 18	12.62 22	4.25 14	3.13 13	0.28 3	0.25 6	1.12 8	2.02 9	1.93 9	1.01 4	39.79 121	49.88 147
Kizimbani ..	3.14 10	1.62 5	18.79 21	23.95 24	7.00 15	5.71 15	0.20 5	0.18 4	1.25 12	0.90 11	2.29 14	1.92 5	66.95 141	67.60 127
Victoria Gardens ..	4.49 11	0.84 4	8.25 16	20.63 23	4.05 12	6.12 11	0.50 5	1.25 7	1.19 7	3.88 11	0.77 4	0.95 4	52.92 115	51.47 124
Makunduchi ..	3.40 10	1.87 4	7.97 15	26.56 24	5.99 16	7.96 14	0.46 4	0.53 2	0.52 2	1.42 4	0.32 2	0.84 3	67.84 100	39.69 87
Mwera ..	4.20 8	1.09 5	17.73 18	15.06 20	5.96 12	4.67 6	1.45 5	0.55 6	1.44 7	1.29 5	0.88 5	1.48 3	55.80 100	55.31 74
Hanyegwa Mchana ..	3.60 12	0.85 4	12.77 25	26.33 22	5.42 14	6.78 19	0.84 7	1.03 6	1.26 9	0.09 4	1.84 6	0.38 4	61.19 132	50.90 124
Muongoni ..	2.89 9	1.21 4	11.00 21	26.38 20	4.69 14	6.75 16	0.25 4	0.10 2	0.89 5	1.22 4	1.06 2	1.73 4	58.17 105	48.09 95
Kisauni ..	4.05 10	2.13 7	7.52 19	23.77 23	4.65 12	4.96 13	0.67 5	0.63 8	0.64 7	2.18 8	4.04 7	1.51 8	56.75 127	55.18 143
Tunguu ..	5.00 10	3.29 7	15.19 20	17.33 19	4.93 12	6.56 16	1.41 6	0.31 2	2.03 5	1.02 5	2.50 4	2.74 3	62.31 109	56.25 104

